ORIGINAL ARTICLE

Analysis of the Degree of Shortness of Breath and the Quality of Life among Stable Patients of Chronic Obstructive Pulmonary Disease at Meuraxa Regional Hospital, Banda Aceh City in Indonesia

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ABSTRACT

Chronic obstructive pulmonary disease (COPD) has a high incidence rate globally, as experienced by about 384 million people around the world. Shortness of breath is the initial and main symptom of COPD that is often complained of during activities. This limitation of activity significantly affects the quality of life of COPD sufferers. The present study aims to analyze relationship between the degree of shortness of breath and the quality of life among stable COPD patients at Meuraxa Regional Hospital, Banda Aceh City in Indonesia. This study employed an observational, analytical method with a cross-sectional design. The study involved a total of 71 respondents, who were COPD patients at the pulmonary polyclinic, between March and June of 2025. Demographic and clinical information was obtained using a structured questionnaire. We utilized the Modified Medical Research Council (mMRC) questionnaire to evaluate the severity of shortness of breath, as well as the COPD Assessment Test (CAT) questionnaire to assess the quality of life of participants. Both mMRC and CAT instruments have been validated for use Indonesian COPD population. The demographic characteristics of stable COPD patients at Meuraxa Regional Hospital, Banda Aceh City showed that the most of the patients were ≥60 years old, male, had primary/secondary education, unemployed and former smokers. Degree 3 the shortness of breath and heavy impact on quality of life were the most common findings. Pearson's correlation coefficient test showed a significant relationship between the degree of shortness of breath and quality of life ($r=0.686$, $p<0.001$). We observed a significant relationship of increased degree of shortness of breath with increased impact on quality of life among stable COPD patients at Meuraxa Regional Hospital, Banda Aceh City, Indonesia.

Keywords: Chronic obstructive pulmonary disease, shortness of breath, quality of life, Indonesia

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INTRODUCTION

Chronic obstructive pulmonary disease (COPD) has a high incidence and mortality rate worldwide and is anticipated to be a significant economic burden among chronic diseases in the future.[1] COPD significantly contributes to global morbidity and mortality, with increasing prevalence.[2] It affects 384 million people globally and presents a significant health burden.[3,4] This disease ranks among the three leading causes of death worldwide, following ischemic heart disease and neoplasms, making it a significant national and global health challenge and over 90% of deaths happen in low- and middle-income countries.[5,6] The Global Initiative for Chronic Obstructive Lung Disease (GOLD) 2024 report defines COPD as a "complex lung condition marked by persistent respiratory symptoms, including shortness of breath, cough, sputum production, and episodes of worsening symptoms known as exacerbations".[7]

COPD is caused by ongoing airflow obstruction in the airways (such as in bronchitis and

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bronchiolitis) and/or the alveoli (as seen in emphysema). The World Health Organization (WHO) reported that COPD was the fourth leading cause of death worldwide in 2021, accounting for 3.5 million deaths, which represented approximately 5% of total global deaths.[8] In 2019, the Ministry of Health of the Republic of Indonesia (Kemenkes RI) reported that in 2006, there were 56.6 million people in the Asia Pacific region suffering from chronic obstructive pulmonary disease (COPD) at moderate to severe levels, representing a prevalence rate of 6.3%.[9] According to GOLD 2024 report, the number of individuals suffering from COPD is projected to rise, approaching 600 million by the year 2050.[7] According to 2023 report of Indonesian Society of Respirology (PDPI), the prevalence of COPD in Indonesia is estimated to be 5.6%, which equates to approximately 4.8 million people.[10]

The first symptom of COPD that commonly appears is dyspnea (shortness of breath).[11,12] Nearly 90% of patients with COPD report experiencing this symptom.[13] The main symptom of COPD is shortness of breath, which typically occurs during physical activity, which usually appears during activity.[14] Irregular shortness of breath can cause sufferers to reduce physical activity. This activity limitation is a significant complaint that affects the quality of life of COPD sufferers.[15] The quality of life in COPD patients declines as the disease worsens and shortness of breath increases. Thus, identifying and assessing quality of life is essential in the management of COPD.[16] Previous studies have demonstrated a significant link between shortness of breath and quality of life in COPD patients.[5,17,18] However, very few reports are available on the analysis of relationship the degree of shortness of breath and the quality of life among stable COPD patients in regional hospitals in Indonesia. Therefore, this study aims to analyze relationship the degree of shortness of breath and the quality of life among stable COPD patients at Meuraxa Regional Hospital in Banda Aceh City, Indonesia.

METHODS

Study design, setting, and sample population: This study employed an observational, analytical method with a cross-sectional design. It was conducted at the Pulmonary Polyclinic of Meuraxa Regional Hospital in Banda Aceh, Indonesia, from March to June of 2025. The population consisted of patients diagnosed with stable Chronic Obstructive Pulmonary Disease (COPD) at the same clinic from March to May 2025. The study sample was determined by applying specific inclusion and exclusion criteria. The inclusion criteria were: participants needed to be willing to take part in the study, possess practical communication skills, not experience exacerbations, be aged 40 years or older, and not be pregnant. The exclusion criteria included patients who refused to participate and those with other complications, such as heart failure or asthma. Total sampling was used as the sampling technique, resulting in a final sample size of 71 respondents.

Data collection and analysis: Demographic and clinical information was obtained using a structured questionnaire. We utilized the Modified Medical Research Council (mMRC) questionnaire to evaluate the severity of shortness of breath, as well as the COPD Assessment Test (CAT) questionnaire to assess the quality of life of participants. Both mMRC and CAT instruments have been validated for use Indonesian COPD population. Data analysis was conducted using IBM SPSS Statistics for Windows, version 25 (IBM Corp., Armonk, NY, USA). We employed both univariate and bivariate methods. Pearson's correlation coefficient test was also done. We measured on 95% confidence interval for statistical decision; statistical significance was set at $p<0.05$.

RESULTS

Table 1 presents the demographic characteristics of the study patients. A significant majority of respondents, 76.1% (54 individuals), are aged 60 years or older. Additionally, 83.1% (59 respondents) are male, and 78.9% (56 respondents) have completed primary or secondary education. Notably, 60.6% (43 respondents) are unemployed. Among the smoking statuses, the highest prevalence is found in the former smoker group, accounting for (77.5%) (37 respondents). Regarding shortness of breath, the highest percentage of stable COPD patients (36.6%) (26 respondents) fall into Grade 3. Furthermore, 50.7% (36 respondents) of the patients are categorized as experiencing a severe impact on their quality of life. Table 2 presents the relationship between the degree of shortness of breath and quality of life

among those stable COPD patients, which revealed that increased degree of shortness of breath caused increased impact on quality of life among our study patients leading to lower quality of life. Table 3 shows that Pearson's correlation coefficient suggests a strong positive correlation ($r=0.686$, $p<0.001$), which indicates that an increase in the degree of shortness of breath is directly associated with increased impact, i.e., lower quality of life.

Table 1: Sociodemographic and clinical characteristics of the study patients (N=71)

Variables	Frequency	Percentage
Age group		
40–59 years	17	23.9
≥60 years	54	76.1
Gender		
Male	59	83.1
Female	12	16.9
Education		
No institutional education	3	4.2
Primary and secondary education	56	78.9
Higher education	12	16.9
Employment		
Employed	28	39.4
Not employed	43	60.6
Smoking history		
Current smokers	18	25.4
Former smokers	37	52.1
Non-smokers	16	22.5
Degree of shortness of breathing		
Grade 0	3	4.2
Grade 1	10	14.1
Grade 2	18	25.4
Grade 3	26	36.6
Grade 4	14	19.7
Quality of life		
Mild to moderate impact	32	45.1
Sever impact	36	50.7
Very severe impact	3	4.2

Table 2: Relationship between degree of shortness of breath and quality of life of the study patients (N=71)

Degree of shortness of breathing	Impacting quality of life			Total
	Mild to moderate Frequency (Percentage)	Severe Frequency (Percentage)	Very severe Frequency (Percentage)	
Grade 0	3 (100.0)	-	-	3 (100.0)
Grade 1	10 (100.0)	-	-	10 (100.0)
Grade 2	13 (72.2)	5 (27.8)	-	18 (100.0)
Grade 3	4 (15.4)	22 (84.6)	-	26 (100.0)
Grade 4	2 (14.3)	9 (64.3)	3 (21.4)	14 (100.0)
Total	32 (45.1)	36 (50.7)	3 (4.2)	71 (100.0)

Table 3: Pearson's correlation coefficient of degree of shortness of breath and quality of life

Degree of shortness of breathing	r	p-value
Quality of life	0.686	<0.001

DISCUSSION

In this study, the majority of respondents were aged 60 years or older, accounting for 76.1% (54 respondents). Age is a significant risk factor for Chronic Obstructive Pulmonary Disease (COPD) because lung function naturally declines over time. Long-term smoking significantly increases the risk of developing COPD, particularly in older adults with a smoking history. This finding aligns with research conducted at Meuraxa Regional Hospital in Banda Aceh (2018), Oksibil Regional Hospital in Papua (2020), and the Makassar Center for Community Lung Health (BBKPM) in 2020, which reported percentages of 49.3%, 36%, and 34.2%, respectively.[19-21] As people age, there is a notable decrease in vital capacity and lung volume. This deterioration in lung function makes older adults more vulnerable to lung diseases. Additionally, longer life expectancies, the aging process itself, and unhealthy lifestyles all contribute to the increasing incidence of COPD among the elderly.[19,22] As individuals age, they often consume more cigarettes. This study revealed that 83.1% of the respondents were predominantly male. Men have a higher prevalence of COPD than women, and smoking is the leading cause of the disease.[22] This finding

aligns with research conducted at West Sumatra Lung Hospital study revealed that 83.1% of the respondents were predominantly male. Men have a higher prevalence of COPD than women, and smoking is the leading cause of the disease.[22] This finding aligns with research conducted at West Sumatra Lung Hospital (2023), Gunung Lingkas Community Health Center in Tarakan City (2021), Ibnu Sina Hospital Makassar (2018-2020), and Muhammadiyah Hospital in Bandung (2021), which reported percentages of 93.8%, 73.7%, 94.3%, and 69%, respectively.[22-25] The prevalence of COPD in men is thought to be related to the high smoking rate in this group. Men tend to smoke more frequently than women, with a prevalence of 62.9% in men compared to 4.8% in women.[23,24]

This study revealed that a significant majority of respondents, specifically 78.9%, had completed primary or secondary education. Education plays a crucial role in influencing disease severity and the acceptance of health information. This finding aligns with research conducted at the Pulmonary Polyclinic of Tabanan General Hospital (BRSU) in Bali (2020), the General Polyclinic of Kalimanah Health Center in Purbalingga (2023), and Dr. H. Soewondo Kendal Regional Hospital (2020), which reported percentages of 52.8%, 38.3% and 30.4%, respectively.[3,26,27] Higher education is positively associated with effective self-care behaviors. Patients with higher education are more likely to access information from various sources. In contrast, COPD patients with lower education levels often experience greater disease severity. This indicates that a lower level of education can negatively impact patients' understanding of their condition and its management.[3]

This study aligns with previous research, showing that the majority of respondents were unemployed (77.5%). Occupation is a significant risk factor for chronic obstructive pulmonary disease (COPD). Jobs that expose individuals to air pollution, dust, smoke, and hazardous chemicals increase the likelihood of developing COPD. This finding aligns with research conducted at Dustira Regional Hospital in Cimahi (2018), Saidu Pakistan Teaching Hospital (2024-2025), and A study at Beijing China-Japan Friendship Hospital (2020-2022), which reported percentages of 68.9%, 91.3%, and 51.7%, respectively.[28-30] A history of recurrent respiratory infections and exposure to secondhand smoke further elevates the risk of COPD. Quitting smoking is the essential first step in managing COPD, and avoiding exposure to risk factors can help slow the progression of the disease.[22,24,31] Chronic Obstructive Pulmonary Disease (COPD) is a persistent lung condition that frequently affects the elderly population. The high prevalence of COPD among older adults suggests that many individuals are either retired or have experienced a decline in their ability to work.[26,29]

This study also revealed that most respondents were former smokers. COPD is a progressive respiratory disorder caused by several risk factors, with long-term exposure to cigarette smoke being the primary one.[24,32] This finding aligns with research conducted at Sebelas Maret University Hospital (2023), the Pulmonology Polyclinic of Persahabatan General Hospital between 2017 and 2018, and Muhammadiyah University of Surabaya (2023), which reported percentages of 56.8%, 89.3%, and 32.1%, respectively.[5,17,33] Inhalation of harmful substances from cigarette smoke and environmental pollution can trigger chronic inflammation in the airways. This inflammatory response increases the number of neutrophils, which are immune cells that release protease enzymes such as cathepsin, neutrophil elastase (NE), and proteinase. These enzymes contribute to damage in the alveoli, the small air sacs in the lungs. Former smokers experience this condition as well, since persistent inflammation can disrupt the structure of the extracellular matrix in lung tissue. The accumulation of these inflammatory effects gradually worsens lung damage, raising both the risk and severity of COPD. Smoking cessation is an important part of the non-pharmacological management for patients with COPD. However, non-smokers are also at risk of developing COPD due to exposure to outdoor pollution, such as motor vehicle exhaust fumes, which are closely linked to decreased lung function.[21,33]

In our study, we found that a significant portion of respondents experienced grade 3 shortness of breath, accounting for 36.6%. The higher number of patients in stage 3 may be attributed to the general characteristics of patients and their perceptions of symptoms.[14,30] This finding aligns with research conducted at Budhi Asih Regional Hospital (2019), which reported that the majority of patients had grade 2 shortness of breath, followed closely by grade 3. Additionally, a study at Wythenhawe Hospital in Manchester,

England, from 2013 to 2015 found the majority of respondents experienced grade 1 shortness of breath, followed by grade 3, with reported percentages of 33.3% and 27.4%, respectively.[14,34] Furthermore, Dustira Cimahi Regional Hospital (2018) found that the majority of respondents experienced grade 3 shortness of breath, accounting for 40%.[28] The severity of symptoms, the ability to perform activities, and personal perception of the respiratory condition also contribute to this.[34] The severity of shortness of breath can vary from person to person, influenced by individual perceptions and physiological factors. In the early stages of the disease, patients may experience shortness of breath during strenuous exercise, which can later persist even with minimal activity. As COPD progresses, the shortness of breath typically worsens over time. These symptoms reflect a gradual and ongoing increase in the level of breathlessness experienced by individuals with the condition.[14,28]

We also observed that 50.7% of respondents experienced severe impacts on their quality of life. For individuals with COPD, quality of life often decreases due to negative impacts of the disease.[35] This finding aligns with research conducted at Airlangga University Hospital (RSUA) in Surabaya (2023) and Dr. H. Soewondo Kendal Regional Hospital (2020), which reported percentages of 71.1% and 60.7%, respectively.[6,27] Additionally, a study at Dhulikhel Hospital and Kathmandu University in Nepal from 2017 to 2018, as well as Haripur District Headquarters Hospital in Pakistan from 2022 to 2023, found that respondents had average total quality of life scores of 68.06 and 59.04, suggesting an even worse quality of life among respondents.[36,37] Several factors influence the decline in quality of life, including decreased lung function, the duration of the disease, age, symptom severity, increased shortness of breath, and low socioeconomic status. Both age and socioeconomic status play significant roles in this decline.[37]

Our study revealed a significant relationship between the degree of shortness of breath (dyspnea) and the quality of life of stable COPD patients (p=0.000). Shortness of breath is a main symptom of COPD, which typically occurs during physical activity. This symptom is the main reason COPD patients reduce physical activity due to discomfort. This limitation often makes it difficult for sufferers to meet their daily needs. This main symptom of COPD negatively impacts the quality of life of COPD patients.[5,17] This finding aligns with research conducted at the Lung Polyclinic of Sebelas Maret University Hospital, Surakarta (2023), the Lung Polyclinic of Persahabatan General Hospital, Jakarta (2020), and the Lung Polyclinic of Zainal Abidin Regional Hospital, Banda Aceh (2019), which reported p-values of 0.001, 0.000, and 0.000, respectively.[5,17,18] The quality of life for patients with COPD tends to decline as the severity of the disease and shortness of breath increase. These physiological limitations, along with shortness of breath, significantly reduce the ability to perform daily activities. As a result, shortness of breath plays a crucial role in diminishing the quality of life for those affected by COPD. Severe shortness of breath has a substantial impact on quality of life, while mild shortness of breath generally affects it to a lesser extent. Additionally, other factors such as age, gender, education, occupation, and smoking status also contribute to the quality of life of COPD patients.[5,17]

Our study has limitations. A small sample from a single centre (due to time and budget constraints) in a specific region may not be able to represent the true picture of the whole country. Therefore, further studies with larger samples selected from different regions of the country are warranted. Apart from that, for further research, it is recommended to add knowledge variables respondents and passive smokers in the smoking status variable in the study.

CONCLUSION

The demographic characteristics of stable COPD patients at Meuraxa Regional Hospital in Banda Aceh City of Indonesia, revealed that the highest percentage of respondents were aged 60 years and older, were male, had received primary or secondary education, were unemployed, and was found in the former smoker group, the degree of shortness of breath found in grade 3, the quality of life was found in the severe impact category. Moreover, a significant positive correlation was observed between the degree of shortness of breath and the quality of life of those stable COPD patients.

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Ethical approval: Ethical approval was obtained from the Health Research Ethics Committee of Dr. Zainoel Abidin Regional General Hospital, Banda Aceh, Indonesia (Reg. No. 070/284/Ba Kesbangpol/2025). Written informed consent was obtained from all participants prior to enrollment, and confidentiality was maintained throughout the study.

Authors' contribution: CA Muthmainnah and Nurfitriani conceptualized and designed the study, CA Muthmainnah, Nurfitriani, SN Andriaty were involved in patient selection, data collection, compilation and analysis. All the authors were equally involved in the manuscript preparation, editing and final submission.

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