


## Comparison of Symptoms and Lung Function in Patients with Chronic Obstructive Pulmonary Disease (COPD) Receiving Monobronchodilators and Dual Bronchodilators

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ARTICLE INFO	ABSTRACT
<p>Article history:</p> <p>Received 20 September 2024</p> <p>Revised 12 November 2024</p> <p>Accepted 30 November 2024</p> <p>Manuscript ID: JSOCMED-20092024-311-3</p> <p>Checked for Plagiarism: Yes</p> <p>Language Editor: Rebecca</p> <p>Editor-Chief: Prof. Aznan Lelo, PhD</p>	<p><b>Introduction:</b> In COPD treatment with a monobronchodilator or dualbronchodilator, can be assessed for the prognosis of therapy outcomes provided to monitor the impact of intervention and recovery of daily activities, prevent acute exacerbations, and improve the productivity of patient's COPD. To determine the comparison between symptoms and lung function in patients with COPD disease receiving monobronchodilator and dual bronchodilator.</p> <p><b>Method:</b> This study is a retrospective cohort study. The research sample consists of COPD patients undergoing treatment with monobronchodilator or dualbronchodilator for a minimum of 3 months or 3 treatment visits. Symptoms are measured using mMRC and lung function is measured using spirometry (FEV1).</p> <p><b>Results:</b> The majority of patients are male (87.1%) and over 60 years old (62.4%), with the majority being smokers (84.7%), and the most common therapy being monobronchodilator (62.4%) and dual bronchodilator (37,6%). There are differences in symptoms and lung function in patients receiving monobronchodilator and dual bronchodilator.</p> <p><b>Conclusion:</b> The dual bronchodilator is more effective in reducing mMRC values, improving by 96.3%, and increasing spirometry values. The average FEV1 value in spirometry for patients using the dualbronchodilator increased by 13,907%, while for the monobronchodilator, it decreased by 5.589%.</p>
<p><b>Keywords</b></p>	<p>COPD, Monobronchodilator, Dualbronchodilator, Symptoms COPD, Lung Function</p>
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## INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a long-term lung disease caused by blocked airways. COPD is one of the leading causes of death worldwide.[1] In 2019, approximately 6% or 3.23 million global deaths were attributable to COPD and by 2030, an increase of 7.8% in COPD-related global deaths is expected.[2] The global incidence rate of COPD is estimated at 10.3%.[3] The incidence rate of COPD in Indonesia is 5.6%.[4] Smoking and exposure to indoor air pollution (including from biomass burning), ambient air pollution, and occupational pollutants have been reported as major risk factors for COPD.

According to the Global Initiative for Chronic Obstructive Lung Disease (GOLD) report, COPD is the fourth leading cause of death in the world and is predicted to become the third leading cause by 2030. This shows the importance of effective treatment and management to control the disease. One of the treatment strategies recommended by GOLD is the use of longterm bronchodilators, either as monotherapy or in

combination. Dual therapy with LABA and LAMA is recommended as an advanced option. As LABA and LAMA have different mechanisms of action, dual therapy may provide greater benefit in lung function improvement and symptom reduction. However, GOLD recommends dual therapy as initial treatment only in patients with COPD with severe symptoms.[5]

Monobronchodilators such as long-acting beta-2 agonists (LABAs) or long-acting anticholinergics (LAMAs) are often used as first-line therapy. However, dual bronchodilator combinations (LABA plus LAMA) have been shown to provide additional benefits in improving lung function and reducing symptoms compared to monotherapy. This combination works in different ways to open the airways, thus providing a synergistic effect.

Monobronchodilator therapy, using LAMA or LABA, is often recommended as the initial maintenance treatment for COPD patients. This approach is particularly suitable for those with a lower symptom burden and fewer exacerbations, While effective for some patients, monobronchodilators may not adequately control symptoms or prevent exacerbations in those with more severe disease. whereas Dual bronchodilator therapy, combining LAMA and LABA, has been shown to provide greater improvements in lung function and symptom control compared to monotherapy. It also reduces the risk of exacerbations and disease progression.[6]

This study aims to compare symptoms and lung function in COPD patients using monobronchodilators and dual bronchodilators at Haji Adam Malik Hospital and Prof. Chairuddin Panusunan Lubis (CPL) USU Medan Hospital. Thus, this study is expected to provide additional evidence regarding the effectiveness of dual bronchodilator treatment than monobronchodilator in the management of COPD.

## METHOD

This study is an analytic observational study with a retrospective cohort design with observations for 3 months of treatment or 3 treatment visits. The data obtained were analyzed descriptively to see the frequency distribution, mean and standard deviation of the characteristics of the study subjects.

Comparison of symptoms and pulmonary faeces based on the type of therapy was carried out using the independent sample t test if the data was normally distributed and using the Mann Whitney test if the data was not normally distributed. Data normality test using Kolmogorov - Smirnov test. Data distribution is said to be normal if the value  $> 0.05$  is obtained and the data distribution is said to be abnormal if the p value is  $< 0.05$ . The results of the analysis are said to be significant if  $p < 0.05$ , with a confidence degree of 95%.

The research sample consists of COPD patients undergoing treatment with monobronchodilator or dualbronchodilator for a minimum of 3 months or 3 treatment visits. Symptoms are measured using mMRC and lung function is measured using spirometry (FEV1). Sample inclusion criteria were Patients diagnosed with chronic obstructive pulmonary disease (COPD), and Patients undergoing monotherapy or dual therapy treatment for 3 months. while exclusion criteria were Patients having other lung diseases such as lung cancer, tuberculosis and others. and Patients who were not compliant with treatment (therapy).

pulmonary function examination using spirometry examination based on changes in pre- and post-therapy FEV1 values in %. Symptoms were measured using The modified-Medical Research Council (mMRC) with the criteria, Improved: if there is a change from the mMRC value and Worsened: if there is no change from the mMRC value.

## RESULTS

This study included 85 COPD patients, with the majority being male (87.1%) and aged over 60 years (62.4%). Most patients were smokers (84.7%) and used monobronchodilator therapy (62.4%).

The results showed that the majority of patients suffered from severe obstruction at the beginning as many as 40 people (47%), and the majority of patients suffered from severe obstruction at the end decreased to 39 people (45.9%).

Table 1. Demographic Characteristics Of The Respondents.

Characteristics	n	%
Gender		
Male	74	87,1
Female	11	12,9
Age		
< 40 Tahun	1	1,1
40-60 Tahun	31	36,5
>60 Tahun	53	62,4
Smoking History		
Smoker	72	84,7
Non-smokers	13	15,3
Type of Therapy		
Monobronchodilators	53	62,4
Dual Bronchodilator	32	37,6
Total	85	100

Table 2. FEV1 Values Of COPD Patients.

FEV	n	%
FEV1 Pre		
Mild Obstruction	2	2,4
Moderate Obstruction	21	24,7
Severe Obstruction	40	47
Extremely Severe Obstruction	22	25,9
FEV1 Post		
Mild Obstruction	4	4,7
Moderate Obstruction	26	30,6
Severe Obstruction	39	45,9
Extremely Severe Obstruction	16	18,8
Total	85	100

Table 3. Comparison Of Symptoms With Bronchodilator Use In COPD Patients.

Therapy	Symptoms				rr	95% ci	p value
	Good		bad				
	N	%	n	%			
Monobronchodilator	27	46,6	31	53,4	16,98	2,237	0,001
Dualbronchodilator	26	96,3	1	3,7		110,173	

It is known that the majority of patients using monobronchodilators improved as many as 27 people (46.6%) with a risk of 16.98. There is a relationship between symptoms and the use of bronchodilators with a p value of 0.001.

Table 4. Comparison of Initial and Final FEV Levels in COPD Patients Using Monobronchodilators and Dualbronchodilators.

Therapy	FEV Pre		FEV Post		Improvement	p value
	median	iqr	median	iqr		
Monobronchodilator	36,60	23	38,70	26	2,85	0,001
Dualbronchodilator	35,50		46			

It is known that there are differences in pulmonary faeces in patients using monobronchodilators and dualbronchodilators with a P value of 0.001.

## DISCUSSION

Based on the results of the study, it was found that the majority of patients were > 60 years old as many as 53 people (62.4%), and the majority were male as many as 74 people (87.1%). Chronic obstructive pulmonary

disease (COPD) is highly prevalent and impacts patients over the age of 60, with this demographic experiencing a higher risk of disease progression and exacerbations.

Aging exacerbates COPD due to physiological changes in the lungs, such as decreased lung function, increased gas trapping, and loss of elastic recoil of the lungs, which are similar to changes seen in COPD itself, suggesting accelerated lung aging in these patients.[7] Frailty, a common condition in elderly COPD patients, is associated with higher adiponectin levels, which correlate with muscle wasting and increased frailty, further complicating the management of COPD in the >60 years age group.[8-9]

Chronic obstructive pulmonary disease (COPD) is traditionally considered a disease that mainly affects men, and indeed, several studies confirm a higher prevalence among men. For example, a study analyzing 420 patients with COPD found that 65.95% were male.[10] Similarly, another study reported that 78.3% of their COPD population were male.[11] However, the gender gap in COPD prevalence is narrowing. In high-income countries, COPD prevalence among women has been equal to that of men since 2008, largely due to increased tobacco exposure and biomass fuel use in low-income countries.[12] A meta-analysis revealed that while the global prevalence of COPD is higher in men (9.23%) compared to women (6.16%), the highest female prevalence is found in North America and urban environments.[13]

Then it is known that the majority of patients smoke as many as 72 people (84.7%). Chronic Obstructive Pulmonary Disease (COPD) is largely associated with smoking, which is a major risk factor for the disease. Studies show that most COPD patients are smokers or have a history of smoking. For example, one study found that 65.83% of COPD patients were smokers, and 48.33% were alcoholics, highlighting the strong correlation between smoking and COPD.[14] Another study reported that 86.67% of COPD patients had a history of smoking, with 58% being heavy smokers.[15] In addition, a study involving newly diagnosed COPD patients revealed that 67.1% were smokers, including 8.9% former smokers.[16] This persistent smoking behavior underscores the need for effective smoking cessation interventions, as smoking cessation is critical to halting the progression of COPD.[10]

Based on the results showed that the majority of patients suffered from group B COPD and did not experience exacerbations. Chronic Obstructive Pulmonary Disease (COPD) is a globally significant health problem, with smoking being a major risk factor, as evidenced by the high prevalence of smokers among COPD patients.[17-19] Group B COPD patients, characterized by fewer exacerbations but more significant symptoms, often experience severe breathlessness and reduced quality of life.[20-21]

Based on the results of the study, it is known that there are differences in symptoms and lung fauna in COPD patients who use monobronchodilators and dualbronchodilators with a P value of 0.014. In patients with chronic obstructive pulmonary disease (COPD), the use of dual bronchodilators, which combine long-acting muscarinic antagonists (LAMA) and long-acting  $\beta$ 2-agonists (LABA), generally results in better symptom control compared with monobronchodilator therapy. Studies have shown that dualbronchodilators improve lung function, health-related quality of life, and reduce exacerbation rates and dyspnea more effectively than monobronchodilators.[22-23] For example, dual bronchodilators have shown greater and consistent efficacy in improving lung function and symptoms, potentially reducing the risk of exacerbations and disease deterioration with a similar safety profile to monobronchodilators.[24]

First, this study used a retrospective design that relied on historical data from medical records, making it susceptible to inconsistencies or incomplete documentation of the variables studied. In addition, the monitoring duration of only three months or three visits may be too short to observe long-term changes in lung function and COPD symptoms, so the results may not reflect the long-term impact of therapy. The study also only used two main measurement tools, namely mMRC to assess symptoms and spirometry (FEV1) for lung function, which may lack comprehensiveness as it did not measure other aspects, such as quality of life or exacerbation rates, that are relevant to COPD patients.

Furthermore, the limited sample size of 85 patients in two hospitals in Medan may limit the generalizability of the results to a wider COPD population or in different geographical contexts. Another limitation was the absence of a control group that did not receive bronchodilators, making it difficult to capture natural changes in COPD symptoms and compare them with the effect of therapy. Finally, although

the study listed adherence to therapy as an inclusion criterion, there were no further details on how to measure or verify such adherence. Inconsistent adherence may affect the results, so this is also a limitation that needs to be considered. These limitations are important to note so that the results can be interpreted more proportionately and taken into consideration in planning future studies that are more comprehensive and accurate.

## CONCLUSION

The use of dual bronchodilators is more effective in improving FEV1 values and reducing symptoms in COPD patients than monobronchodilators, Dual therapy can provide greater benefits in the management of COPD, so it is recommended as a more effective.

treatment option. Significant improvements in lung function parameters and symptom scores suggest that the combination of dual bronchodilators provides a stronger synergistic effect compared to the use of a single monobronchodilator. Thus, the results of this study provide strong evidence that dual bronchodilators may be a better treatment option for COPD patients. Education and long-term management are very important in the management of COPD. It is hoped that with this study, medical practitioners can better understand the importance of dual bronchodilator use in improving the quality of life of COPD patients. Further research is needed to explore the mechanism underlying the difference in effect between the two types of therapy and to evaluate the effectiveness in a wider population. Thus, the results of this study are expected to provide additional information for medical practitioners in choosing the optimal treatment strategy for COPD patients, as well as encourage further research to improve the quality of life of COPD patients.

## DECLARATIONS

Ethics approval and consent to participate. Permission for this study was obtained from the Ethics Committee of Universitas Sumatera Utara and Haji Adam Malik General Hospital.

## CONSENT FOR PUBLICATION

The Authors agree to publication in Journal of Society Medicine.

## FUNDING

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## COMPETING INTERESTS

The authors declare that there is no conflict of interest in this report.

## AUTHORS' CONTRIBUTIONS

All authors significantly contribute to the work reported execution, acquisition of data, analysis, and interpretation, or in all these areas. Contribute to drafting, revising, or critically reviewing the article. Approved the final version to be published, agreed on the journal to be submitted, and agreed to be accountable for all aspects of the work.

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