Indonesian Journal of Medicine (2026),11(02): 84-92
Masters Program in Public Health, Universitas Sebelas Maret

Research
Open Access

Identification of Physiotherapy Problems in Patients with Chronic Obstructive Pulmonary Disease at Respira Hospital Yogyakarta: An Observational Study

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Received: 16 February, 2026; Accepted: 28 March, 2026; Available online: 10 April, 2026

ABSTRACT

Background: Chronic Obstructive Pulmonary Disease (COPD) is a leading cause of morbidity and mortality worldwide. Common symptoms include dyspnea, chest pain, reduced thoracic expansion, and impaired pulmonary function. This study aimed to identify physiotherapy-related problems among patients with COPD at Respira Hospital Yogyakarta.

Subject and Methods: This observational study was conducted from June to August 2025 at the Physiotherapy Outpatient Clinic of Respira Pulmonary Hospital, Yogyakarta. Physiotherapy-related problems were assessed using the modified Medical Research Council (mMRC) Dyspnea Scale, COPD Assessment Test (CAT), thoracic mobility measurements, Visual Analog Scale (VAS), Peak Flow Meter (PFM), and Incentive Spirometer.

Results: A total of 102 patients with COPD participated in the study. Most participants were male (60.8%). Grade 2 dyspnea was reported by 50.0% of subjects, while 65.7% had moderate COPD symptoms. Impaired thoracic mobility was observed in 40.2%–47.1% of patients. Chest pain was reported by only one subject. Severe airflow obstruction was found in 60.8% of participants, with a mean peak expiratory flow of 52.08% of the predicted value. Impaired inspiratory capacity was identified in 48.0% of subjects.

Conclusion: The main physiotherapy-related problems identified among patients with COPD at Respira Hospital Yogyakarta were dyspnea, COPD symptoms, impaired thoracic mobility, reduced peak expiratory flow, and decreased inspiratory capacity.

Keywords: Chronic Obstructive Pulmonary Disease (COPD), physiotherapy, thoracic mobility, dyspnea, peak expiratory flow.

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Cite this as:
Kusumaningtyas M, Handari HK, Prayitno (2026). Identification of Physiotherapy Problems in Patients with Chronic Obstructive Pulmonary Disease at Respira Hospital Yogyakarta: An Observational Study. Indones J Med. 11(02): 84-92. https://doi.org/10.26911/theijmed.2026.955

BACKGROUND

Chronic Obstructive Pulmonary Disease (COPD) is one of the leading causes of morbidity and mortality worldwide, with a continuously increasing prevalence, particularly among older adults and active smokers (Agustí and Faner, 2023). The increasing level of air pollution caused by cigarette smoke, motor vehicle emissions, industrial activities, and other environmental pollutants has significantly affected public health, particularly respiratory

health. COPD is a chronic respiratory disease associated with long-term exposure to air pollutants and tobacco smoking (Haritsah et al, 2022). It is defined as a heterogeneous lung condition characterized by chronic respiratory symptoms, including dyspnea, cough, and sputum production, resulting from airway abnormalities (bronchitis and bronchiolitis) and/or alveolar abnormalities (emphysema), leading to persistent and often progressive airflow limitation (Barnes, 2020).

COPD is the fourth leading cause of death worldwide and is projected to become the third leading cause of morbidity and mortality by 2030. In 2012, COPD accounted for approximately 6% of all global deaths, representing nearly three million deaths worldwide (Agustí & Faner, 2023).

According to the 2013 Indonesian Basic Health Research (Riskesdas), the prevalence of COPD in Indonesia was 3.7%, equivalent to approximately 9.2 million individuals living with COPD (Ministry of Health of the Republic of Indonesia, 2013). At the provincial level, the prevalence of COPD in the Special Region of Yogyakarta was reported to be 3.1%, corresponding to 6,719 cases. Common clinical manifestations experienced by patients with COPD include dyspnea, chest pain, reduced thoracic expansion, and impaired pulmonary function (Perhimpunan Dokter Paru Indonesia, 2023).

This study aimed to identify the clinical conditions of patients with COPD at Respira Hospital Yogyakarta, including the severity of dyspnea, COPD symptom burden, thoracic mobility, chest pain intensity, peak expiratory flow, and inspiratory volume. The findings are expected to provide baseline information for developing more effective physiotherapy intervention plans for patients with COPD at Respira Hospital Yogyakarta.

SUBJECTS AND METHOD

1. Study Design

This study employed a descriptive observational design. Data were collected through direct assessment of physiotherapy-related problems among patients diagnosed with COPD. The study was conducted from June to August 2025 at the Physiotherapy Outpatient Clinic of Respira Pulmonary Hospital, Yogyakarta.

2. Population and Sample

The study population consisted of all patients with COPD who received physiotherapy services at Respira Hospital Yogyakarta between June and August 2025. A total of 102 participants who met the inclusion and exclusion criteria were enrolled in the study. The inclusion criteria were: (1) patients diagnosed with COPD and (2) willingness to provide written informed consent. The exclusion criteria were: (1) the presence of severe comorbidities and (2) cognitive or psychological impairments that could interfere with effective communication.

3. Study Variables

The variables investigated in this study were physiotherapy-related problems experienced by patients with COPD, including: (1) dyspnea severity, (2) COPD symptom burden, (3) thoracic mobility, (4) chest pain intensity, (5) peak expiratory flow, and (6) inspiratory volume.

4. Operational Definition of Variables

The operational definitions of the study variables were as follows:

Dyspnea Severity was defined as the degree of breathlessness measured using the Modified Medical Research Council (mMRC) Dyspnea Scale, with scores ranging from 1 to 5.

COPD Symptom Burden was defined as the severity of COPD-related symptoms assessed using the COPD Assessment Test (CAT), with scores ranging from 0 to 40,

where higher scores indicate greater symptom severity.

Thoracic Mobility was defined as the extent of chest expansion measured using a measuring tape and expressed in centimeters (cm).

Chest Pain Intensity was defined as the level of pain measured using the Visual Analog Scale (VAS), ranging from 0 to 10, where higher scores indicate more severe pain.

Peak Expiratory Flow (PEF) was defined as the maximum airflow achieved during forced expiration, measured using a Peak Flow Meter (PFM) and expressed in liters per minute (L/min).

Inspiratory Volume was defined as the maximum volume of air inhaled during inspiration, measured using an Incentive Spirometer and expressed in milliliters (mL).

5. Study Instruments

The instruments used in this study included: (1) the Modified Medical Research Council (mMRC) Dyspnea Scale for assessing dyspnea severity; (2) the COPD Assessment Test (CAT) for evaluating COPD symptom burden; (3) a measuring tape for assessing thoracic mobility; (4) the Visual Analog Scale (VAS) for assessing chest pain intensity; (5) a Peak Flow Meter (PFM) for measuring peak expiratory flow; and (6) an Incentive Spirometer for measuring inspiratory volume.

6. Data Analysis

The data were analyzed descriptively using the Statistical Package for the Social Sciences (SPSS) software.

7. Research Ethics

This study was reviewed and approved by the Health Research Ethics Committee of Respira Pulmonary Hospital Yogyakarta. Ethical approval was granted under reference number: 10/KEPK/IV/2025.

RESULTS

1. Sample Characteristics

A total of 102 patients with Chronic Obstructive Pulmonary Disease (COPD) at Respira Hospital Yogyakarta were included in this study. The sample consisted of 62 males (60.8%) and 40 females (39.2%), with ages ranging from 32 to 85 years. The patients' body mass index (BMI) ranged from underweight to obesity class II, with the largest proportions classified as normal weight (42.2%) and underweight (33.3%).

Table 1. Sample Characteristics Identification of Physiotherapy Problems in Patients with Chronic Obstructive Pulmonary Disease at Respira Hospital Yogyakarta (Continuous Data)

Variable	Mean	SD	Min.	Max.
Age (years)	63.54	8.85	32	85

Table 2. Sample Characteristics Identification of Physiotherapy Problems in Patients with Chronic Obstructive Pulmonary Disease at Respira Hospital Yogyakarta (Categorical Data)

Characteristic	Category	Frequency	Percentage (%)
Sex	**Male**	62	60.8
	Female	40	39.2

Characteristic	Category	Frequency	Percentage (%)
Body Mass Index Category	**Underweight**	34	33.3
	Normal weight	43	42.2
	Overweight	9	8.8
	Obesity Class I	13	12.7
	Obesity Class II	3	2.9

2. Identification of Physiotherapy-Related Problems

a. Characteristics of Subjects Based on Dyspnea Severity

Assessment of dyspnea severity using the modified Medical Research Council (mMRC) Dyspnea Scale showed varying levels of breathlessness among the participants. A total of 17.6% of subjects had Grade 0 dyspnea, 18.6% had Grade 1 dyspnea, 50.0% had Grade 2 dyspnea, and 13.7% had Grade 3 dyspnea.

b. Characteristics of Subjects Based on COPD Symptom Severity

Assessment using the COPD Assessment Test (CAT) demonstrated that 20.6% of participants had mild symptoms, 65.7% had moderate symptoms, and 13.7% had severe symptoms.

c. Characteristics of Subjects Based on Thoracic Mobility

Thoracic mobility was assessed at the axillary level, the fourth intercostal space (ICS 4), and the xiphoid process using a measuring tape. The recorded thoracic expansion ranged from 0.5 cm to 7.0 cm at both the axillary and ICS 4 levels, and from 1.0 cm to 6.5 cm at the xiphoid process level. Most participants demonstrated normal thoracic mobility, accounting for 54.9% at the axillary level, 59.8% at ICS 4, and 52.9% at the xiphoid process level.

d. Characteristics of Subjects Based on Chest Pain

Chest pain was assessed using the Visual Analog Scale (VAS), with scores ranging from 0 to 10. Of the 102 participants, 101 (99.1%) reported no chest pain, while only one participant (0.9%) reported chest pain with a VAS score of 5 out of 10.

e. Characteristics of Subjects Based on Peak Expiratory Flow

Peak expiratory flow (PEF) was measured using a Peak Flow Meter. The percentage of predicted normal values ranged from 2.67% to 150.0%, with a mean value of 52.08%. Based on PEF classification, 19.6% of subjects were categorized as normal, 2.9% had mild airflow obstruction, 16.7% had moderate airflow obstruction, and 60.8% had severe airflow obstruction.

f. Characteristics of Subjects Based on Inspiratory Capacity

Inspiratory capacity was measured using an Incentive Spirometer. The percentage of predicted normal values ranged from 6.9% to 166.67%, with a mean value of 79.51%. A total of 52.0% of participants demonstrated normal inspiratory capacity, while the remainder were classified as having mild impairment (15.7%), moderate impairment (15.7%), and severe impairment (16.7%).

Table 3. Identification of Physiotherapy-Related Problems

Characteristic	Category	Frequency	Percentage (%)
Dyspnea Severity	**Grade 0**	18	17.6
	Grade 1	19	18.6
	Grade 2	51	50.0
	Grade 3	14	13.7
COPD Symptom Severity	**Mild Symptoms**	21	20.6
	Moderate Symptoms	67	65.7
	Severe Symptoms	14	13.7
Normal Thoracic Mobility	**Axillary Level**	56	54.9
	ICS 4 Level	61	59.8
	Xiphoid Process Level	54	52.9
Limited Thoracic Mobility	**Axillary Level**	46	45.1
	ICS 4 Level	41	40.2
	Xiphoid Process Level	48	47.1
Chest Pain	**Present**	1	0.9
	Absent	101	99.1
Peak Expiratory Flow	**Normal**	20	19.6
	Mild Obstruction	3	2.9
	Moderate Obstruction	17	16.7
	Severe Obstruction	62	60.8
Inspiratory Capacity	**Normal**	53	52.0
	Mild Impairment	16	15.7
	Moderate Impairment	16	15.7
	Severe Impairment	17	16.7

DISCUSSION

This study involved 102 patients with Chronic Obstructive Pulmonary Disease (COPD), of whom males accounted for the majority (60.8%). This finding is consistent with previous literature indicating that although the prevalence of Chronic Obstructive Pulmonary Disease (COPD) among women has increased, the overall incidence and prevalence remain higher among men, particularly in countries with historically high smoking rates among males (Zhang et al., 2021).

Based on Body Mass Index (BMI), most participants were classified as having normal weight (42.2%) or being underweight (33.3%). The high proportion of underweight patients represents an important clinical finding. In COPD, underweight status is commonly associated with malnutrition, increased energy expenditure (hypermetabolism), and respi-

ratory muscle atrophy, all of which may worsen prognosis and contribute to greater dyspnea severity (Habibech, 2014).

Assessment using the modified Medical Research Council (mMRC) Dyspnea Scale demonstrated that dyspnea was a predominant problem among the study population. Half of the participants (50.0%) experienced Grade 2 dyspnea, indicating that they walked slower than people of the same age on level ground or had to stop for breath when walking at their own pace. This finding suggests that respiratory dysfunction substantially affects the ability to perform daily physical activities. These results are consistent with those reported by Lee et al. (2021), who found that reduced thoracic mobility and inspiratory capacity were associated with higher mMRC scores, particularly among individuals with restrictive or obstructive breathing patterns. Dyspnea assessed by the mMRC scale reflects not only pulmonary impairment but also Musculoskeletal dysfunction of the thoracic cage that may limit optimal lung expansion (Lee et al., 2021).

The severity of COPD symptoms among the participants was predominantly classified as moderate, accounting for 65.7% of the total sample. This finding is consistent with the high prevalence of severe expiratory airflow obstruction, impaired inspiratory capacity, and Grade 2 dyspnea observed in the present study. The symptom classification indicates that most participants experienced not only objective pulmonary dysfunction but also clinically significant symptoms affecting their daily condition.

Symptom assessment in COPD is essential for determining treatment intensity and anticipating the risk of exacerbations (Oliveira et al., 2018). The predominance of moderate-to-severe symptoms (79.4%) suggests a substantial disease burden within the study population. Cirak et al. (2022) emphasized that among patients with persistent COPD symptoms, multimodal approaches incorporating breathing exercises, inspiratory muscle training, and physical exercise are effective in reducing symptoms, improving exercise tolerance, and preventing disease progression. Therefore, comprehensive screening and management strategies that include assessment and treatment of thoracic musculoskeletal components should be considered in individuals with COPD (Cirak et al., 2022).

Thoracic mobility measurements obtained at three anatomical levels demonstrated relatively homogeneous results, with average mobility ranging from 2.73 cm to 2.87 cm. These findings are consistent with Gaillard et al. (2025), who reported that thoracic mobility among adults, particularly those with respiratory disorders or postural abnormalities, often shows considerable variability and a high prevalence of movement restriction. The present findings confirm that nearly half of the participants exhibited impaired chest wall mechanics. Limited thoracic mobility, observed in approximately 40–47% of participants across all measurement sites, represents an important clinical concern due to its association with respiratory function.

Restricted mobility may reduce respiratory muscle efficiency and limit optimal lung expansion during inspiration, potentially exacerbating respiratory symptoms. Similarly, Mustafaoglu et al. (2019) demonstrated that interventions aimed at improving thoracic mobility, such as manual therapy and specific stretching exercises, can enhance inspiratory capacity and reduce the sensation of breathlessness. Routine assessment of thoracic mobility,

particularly among individuals with COPD or respiratory symptoms, should therefore be considered a crucial component of comprehensive evaluation to support more effective and targeted rehabilitation strategies (Mustafaoglu et al., 2019).

Among the 102 participants, 101 reported no chest pain, while only one participant reported moderate pain with a Visual Analog Scale (VAS) score of 5/10. These findings suggest that chest pain was not a predominant problem in the study population. This observation is consistent with the study by Al-Ani et al (2015). which reported a relatively low prevalence of non-cardiac chest pain in the general population without specific risk factors. Furthermore, functional thoracic limitations may occur without the presence of pain symptoms (Al-Ani et al., 2015).

The predominance of severe airflow obstruction (60.8%) and the substantially reduced mean peak expiratory flow (52.08% of the predicted value) represent clinically significant findings. These results indicate severe expiratory airflow limitation, which may contribute to impaired gas exchange, increased work of breathing, and reduced exercise tolerance.

As demonstrated in the present study, restricted thoracic mobility may serve as a mechanical contributor to reduced peak expiratory flow by limiting thoracic expansion and recoil during respiration (Suma et al., 2025). Comprehensive interventions targeting thoracic mobility and respiratory muscle strength should therefore be incorporated into the management of patients with this clinical profile, in accordance with current pulmonary rehabilitation guidelines (Yu et al., 2026).

The mean inspiratory capacity was 79.51% of the predicted value, with slightly more than half of the participants (52.0%) classified as normal. Nevertheless, 48.0% of participants demonstrated varying degrees of impairment, including mild (15.7%), moderate (15.7%), and severe impairment (16.7%). These findings are consistent with those reported by Kabitz et al. (2007), who noted that although inspiratory capacity is often better preserved than expiratory parameters during the early stages of respiratory dysfunction, inspiratory impairment may still occur and contribute to inefficient breathing patterns and increased respiratory muscle workload. Severe inspiratory impairment (16.7%) may indicate restricted lung expansion or weakness of the primary inspiratory muscles, particularly the diaphragm. Such conditions may also be influenced by limited thoracic mobility, as observed in the present study.

Padkao et al. (2020) reported a positive correlation between chest wall mobility and inspiratory capacity, suggesting that improved thoracic flexibility may contribute to increased inspiratory volume. Therefore, these findings highlight the importance of therapeutic approaches that focus not only on expiratory dysfunction (severe airflow obstruction) but also on optimizing inspiratory function through inspiratory muscle training and thoracic mobilization exercises to achieve more balanced and comprehensive respiratory rehabilitation (Bissett et al., 2019).

AUTHORS' CONTRIBUTIONS

MK designed and supervised the study, analyzed the data, and drafted the manuscript. H assisted with data analysis and manuscript preparation. P conducted the study and contributed to data collection and interpretation. All authors approved the final manuscript.

FINANCIAL SUPPORT AND SPONSORSHIP

This study was supported by the Health Polytechnic of the Ministry of Health Surakarta (Poltekkes Kemenkes Surakarta).

ACKNOWLEDGEMENT

The authors would like to express their sincere gratitude to the Head of the Department of Physiotherapy, Poltekkes Kemenkes Surakarta, for granting permission and support for the conduct of this study. The authors also thank all personnel involved in data collection and all participants for their cooperation and willingness to take part in this research.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this study.

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