Introduction: Chronic obstruction pulmonary disease (COPD) is a chronic airflow disorder along with decreasing health status. COPD assessment test (CAT) is commonly used to assess the health status of patients and their medical results. The aim of this study was to assess the therapeutic outcomes in patients with COPD using CAT in private hospitals in Yogyakarta.

Materials and Methods: This was a cross-sectional study involving 156 patients, aged >40 years who had completed the CAT questionnaire. CAT scores were categorized into four groups and consisted of eight items: cough, phlegm, chest tightness, breathlessness going up hills/stairs, activity limitations at home, confidence leaving home, sleep, and energy. The four categories were successful therapy (CAT scores <10), moderately successful CAT 10–19), less successful (CAT scores 20–30), and unsuccessful (CAT score >30). The study was conducted from April to August 2018 at two Private Hospitals in Yogyakarta followed by descriptive-analytical data processing and chi-square analysis.

Results: The therapeutic outcomes of COPD were 30.13% successful (CAT score: <10), 60.26% moderately successful (CAT score: 10–19), 9.62% less successful (CAT score: 20–30), and there were no patients with unsuccessful therapy. The majority of patients had moderate airflow severity. Exacerbation condition, severity level, and type of therapy showed a significant result (P < 0.05) toward therapy results with COPD measurement, and from eight CAT items, it was identified that 37.8% of respondents had breathlessness going up hills/stairs. Conclusion: CAT can assess the therapeutic outcomes and COPD patient’s health status with moderately successful therapy (CAT score 10–19) in more than sixty percent of respondents.

Keywords: Chronic obstructive pulmonary disease (COPD), COPD assessment test (CAT), therapeutic outcomes
test (CAT) is mostly used as a simple tool in assessing the impact of COPD, patient’s health status, and therapeutic outcomes, but to determine the diagnosis and severity of COPD, the FEV1 value of pulmonary function test results is still required. A meta-analysis study shows that CAT has proved to be reliable, valid, and responsive to be used as a tool to predict COPD exacerbations and to measure health status of patients. Patient’s health status can positively correlate with exacerbations and to measure health status of patients, and responsive to be used as a tool to predict COPD exacerbations. CAT is responsive to measure outcomes of therapy with similar results to dyspnea scale and lung function test. It is a potentially useful instrument for assessing the efficacy of treatment in COPD exacerbations.

The therapeutic results of patients with COPD with CAT questionnaire is assessed through the decrease in patient’s symptoms according to the Global Initiative of Chronic Obstructive Lung Disease (GOLD) that consists of eight items related to respiratory disorders: cough, phlegm, chest tightness, breathlessness, activity limitation at home, confidence in leaving home, sleep, and energy. This research aims to assess the therapy result in two private hospitals in Yogyakarta by using CAT questionnaire. This study complements previous research, which evaluates the success of treatment from subjective data of COPD symptoms by using CAT.

**Materials and Methods**

This research was done observationally with a cross-sectional study design to assess the therapy outcomes of patients with COPD using the CAT questionnaire from April to August 2018. Research consent in the form of Ethical Clearance was obtained from the Ethics Committee of Medical Faculty of Gadjah Mada University Yogyakarta in March 2018. The test subjects involved were 156 COPD outpatients in two private hospitals in Yogyakarta who met the inclusion criteria of ≥ 40 years old and filling the CAT questionnaire completely. Patients who agreed to be involved in this research were required to sign informed consent and to receive medication treatment in the last four weeks. The exclusion criteria were patients with asthma, heart failure, and lung cancer. The patients’ data (gender, patient’s age, COPD duration, education level, profession, smoking status, exacerbation status, severity level, and maintenance therapy) were obtained from patient data sheet and medical record. The measurement of therapy outcomes was conducted by asking the test subjects to fill out the CAT questionnaire completely. The questionnaire was distributed through accidental sampling to patients who came to hospital for their monthly visits. The category of therapy outcomes is divided into four groups, including successful therapy (CAT scores <10), moderately successful CAT 10–19), less successful (CAT scores 20–30), and unsuccessful (CAT score >30). The content of CAT questionnaire depicts the symptom recovery and life quality of patients with COPD after receiving therapy for a minimum of four weeks. This questionnaire was adopted from CAT Development Steering Group 2012, and the validation test has been done as well (total item correlation: 0.25, r count: >0.8, and Cronbach α reliability: >0.600). The data analysis served numbers and percentages descriptively using Microsoft Excel 2016 and bivariate analysis (chi-square) in measuring the success prediction of CAT score toward patient’s characteristic data.

**Results**

This research involved 156 outpatients, in which most of them were men aged >60 years old. In general, patients with COPD in this research were active smokers who have suffered COPD for <3 years. Based on the GOLD classification result, the severity level of the majority of patients was categorized as moderate, with maintenance therapy as the medical treatment option as specified in Table 1. Table 1 shows that 60.26% of respondents have a moderately successful therapy (CAT score 10–19) and there was no one with unsuccessful therapy. After bivariate statistical test (chi-square, spearman) between respondent’s characteristics toward therapy outcomes of patients with COPD measured with CAT, it shows that exacerbation status, severity level, and type of maintenance therapy used have significant differences toward CAT scores that measure the therapy outcomes (P < 0.05).

CAT questionnaire depicts the therapy outcomes measured from symptoms experienced by patients with COPD. The percentage detail of COPD symptoms on each question item is shown in Table 2. The result from Table 2 explains that the CAT scores of 156 respondents are overall under symptom recovery. The average CAT result on every symptom shows 1 and 0 score, indicating that the therapeutic outcomes including symptom recovery of patients with COPD show some signs of fruitfulness. There are 37.82% respondents feeling breathlessness when walking up a hill or one flight of stairs and resulting in 3 for CAT score.

**Discussion**

This research aimed to predict the successfulness of therapy for patients with COPD using CAT questionnaire on some characteristics of respondents.
Currently, there are numerous recommendations to assess not only the worsening of symptoms and patient’s health status but also the therapeutic outcomes of patients with COPD. On several inquiries, CAT also provides ease of use for both researchers and respondents in understanding and assessing the impact of medication and diseases on a daily basis.
The results of overall therapy outcome measurement using CAT give an overview that more than sixty percent of patients with COPD show a moderately successful therapy. This is in line with previous research\(^\text{[10]}\) in which CAT is quite effective to assess the medical efficacy in preventing or handling COPD with or without exacerbations. The therapy successfulness of patients with COPD assessed using CAT questionnaire is measured by looking at the symptom recovery felt by patients during treatment.

Based on the variables in Table 1, exacerbations correlate with therapeutic results \((P < 0.05)\) indicated by 64.74\% respondents who have increased sputum purulence and volume as well as increased frequency of dyspnea, thereby making them go to the hospital for oxygen, bronchodilator, mucolytic, and antibiotic treatment.\(^1\) Such condition can significantly affect patients’ quality of life and treatment outcomes, and this is in line with the findings of a previous study in which exacerbations in patients with COPD correlate with changes in CAT scores for assessing therapeutic outcomes. Therefore, CAT can be considered as a simple tool for identifying improvement and prevention of exacerbation risk.\(^{[11]}\)

In terms of medication, patients with COPD receive bronchodilator and maintenance therapy. The bronchodilator therapy includes SABA (short-acting \(\beta-2\) agonist), SAMA (short-acting muscarinic antagonist), xanthine, antibiotics, and OCS (oral corticosteroids). Previous findings also show that antibiotics, bronchodilators, corticosteroids, and mucolytics are effective for COPD acute exacerbations to relieve symptoms, resolve exacerbation causes, and reduce length of hospital stay.\(^{[12]}\) Meanwhile, the maintenance therapy received by the respondents consists of LAMA (long-acting muscarinic antagonist), ICS (inhalation corticosteroids), and LABA (long-acting \(\beta-2\) agonist). The use of maintenance therapy is associated with improvement in FEV\(_1\), quality of life scores, repairs to lung function and dyspnea, and reduced frequency of exacerbations.\(^{[13]}\) The acute and maintenance therapy in this study correlates with therapeutic results \((P < 0.05)\). This will therefore influence the success of therapy for patients with COPD in both lung function tests and CAT examination.\(^1\)

The exacerbation condition and severity level of patients with COPD in this research cannot be assessed using lung function tests as such test is generally unavailable in Indonesia. Therefore, CAT scores will become a good alternative to test lung function, especially for those with inability to pay.\(^{[14]}\) The severity level in this research is measured with GOLD in the form of subjectivity data toward the symptoms felt by respondents.\(^1\) The research data shows that 51.28\% patients with medium severity level also undergo some exacerbation symptoms and will feel them more frequently \((P < 0.05)\). Along with the increasing severity level, the therapeutic options and results from COPD medication will also be affected.\(^{[15]}\) Such results are similar to the data of 161 patients with COPD who filled in the CAT questionnaire and had some observation for 11–12 days, resulting in significant changes \((P < 0.001)\) toward CAT scores and decreased symptoms.\(^6\)

CAT is a questionnaire that has been validated and standardized to help monitor therapy effects. CAT outcomes show patients’ health status improvement through question items, including cough, phlegm, chest tightness, breathlessness going up hills/stairs, activity limitations at home, confidence leaving home, sleep, and energy.\(^{[16]}\) The result of CAT questionnaire indicates that breathlessness going up hills/stairs symptom is mostly perceived by respondents during the medication. This condition is emphasized by previous research,\(^{[17]}\) in which the majority of patients with COPD have a bad health status and chronic symptom records (breathlessness going up hills/stairs) as a result of irreversible impaired lung function. The domain symptoms, in terms of chest feeling very tight, limited activities at home, and not confident leaving home, are seen to be less experienced by the respondents of this research. They tend to have routine hospital visits during treatment, and more than half of the patients are well controlled through the administered medication.

The strength of this research is the use of a simple measuring instrument that specifically assesses the symptoms of disease and has proved to be well validated according to the research criteria. The number of questions is not that many, so the respondents tend to focus more on filling up the questionnaire to avoid bias.\(^3\) CAT can also significantly illustrate the changes in health status of patients with COPD who have received medication therapy for approximately four weeks.

This research has some weaknesses in that the subjective data related to severity level and therapy outcomes cannot be confirmed with objective data, such as spirometry of lung function test. This is because in Indonesia, spirometry test is covered only once a year by the Universal Health Coverage (JKN), whereas the rest becomes the responsibility of patients to pay the bill if they want to know whether their COPD condition is controlled. Also, the possibility of reversible levels of FEV\(_1\) or percentage changes in FEV\(_1\) will be different when further testing is carried out.\(^{[18]}\) Another limitation is the exacerbation data of respondent’s characteristics obtained from collaboration with the
medical personnel of the hospital where this research is done. After patients with exacerbations have made an improvement in their conditions following nebulizer therapy, they will be included in this research. This only applies to the hospital where this research is being conducted and cannot be generalized to other hospitals.

CONCLUSION

In this research, CAT can assess the therapeutic outcomes of patients with COPD with the results indicating that more than 60% of patients with COPD achieved moderately successful therapy. Overall, CAT score items show that the symptom of breathlessness going up hills/stairs mostly dominates patients’ condition. Therefore, the role of medical personnel is required to keep educating patients about the importance of discipline in medication and monthly hospital visits. CAT item scores vary depending on the characteristics of an individual. The importance of individual approach should be emphasized to understand the mechanism that triggers changes in health status of patients with COPD.

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Conflicts of interest

There are no conflicts of interest.

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