Assessing the Management of COPD: A Cross-Sectional Study on Medication Practices in a Tertiary Care Hospital

Afsana Naznin[1], Dr. Md Mahmudul Hasan Rasel[2], Dr. Nargis Akter [3],
Dr.Ahmed Imran[4], Dr. Rifah Rawnak Azad[5],Prof. Dr. Adhir Kumar Das[6]

[1]M. Phil. (Pharmacology), Lecturer, Department of Pharmacology & Therapeutics, Dhaka Medical College, Dhaka, Bangladesh.

[2]Assistant Registrar, Department of Respiratory Medicine, Sir Salimullah Medical College and Mitford Hospital, Dhaka, Bangladesh

[3]M. Phil. (Pharmacology), Lecturer, Department of Pharmacology & Therapeutics, Comilla Medical College, Cumilla, Bangladesh

[4]MCPS, MD (Radiology& Imaging), Medical Officer, Department of Radiology & Imaging,Comilla Medical College, Cumilla, Bangladesh.

[5]M. Phil. (Pharmacology), Medical officer, Department of Pharmacology and therapeutics, Dhaka medical College, Dhaka, Bangladesh

[6]Professor & Ex-Head of the Dept. Of Pharmacology & Therapeutics, Dhaka Medical College, Dhaka, Bangladesh.

Corresponding Author: Afsana Naznin

Abstract: Background: *Chronic Obstructive Pulmonary Disease (COPD) is a leading cause of morbidity and mortality globally, characterized by irreversible airflow limitation. It is often associated with comorbidities that complicate treatment. Polypharmacy, the use of multiple medications, is common among COPD patients and can result in adverse health outcomes. Despite its significance, research on medication practices for COPD in tertiary care hospitals, especially in Bangladesh, remains limited.* **Objective:** *This study aimed to assess the medication practices in COPD management at a tertiary care hospital, evaluate prescribing patterns, and identify factors influencing medication choices, including comorbidities and polypharmacy.* **Methods:** *This observational, descriptive, cross-sectional study was conducted at the Respiratory Medicine Outpatient Department of Dhaka Medical College Hospital, Bangladesh, from July 2021 to June 2022. A total of 188 COPD patients, diagnosed based on clinical evaluation and spirometry, were included. A convenient sampling method was used to select participants. Data were analyzed using SPSS version 27. Descriptive statistics were applied to demographic characteristics, and logistic regression was used to identify factors predicting polypharmacy.* **Results:** *The majority of patients were prescribed inhaled corticosteroids (85.6%) and short-acting beta-agonists (79.3%), with a significant proportion receiving combination therapies like LABA+LAMA (23.4%). The study found that comorbidities such as cardiovascular diseases, diabetes, and obesity were common and influenced medication practices. The use of polypharmacy was prevalent, with patients on multiple medications to manage both COPD and comorbid conditions. Logistic regression analysis identified age, smoking history, and comorbidities as significant factors influencing medication use.* **Conclusion:** *This study underscores the complexity of COPD management, especially in the presence of comorbidities. It highlights the need for personalized treatment strategies, better management of comorbidities, and greater use of advanced therapies. Enhancing medication adherence and addressing polypharmacy may improve outcomes for COPD patients.*

Keywords:*Chronic Obstructive Pulmonary Disease (COPD), Medication Practices, Comorbidities, Tertiary Care Hospital, Prescribing Patterns*

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I.   Introduction

One of the most prevalent respiratory conditions in the world today is COPD [1]. According to some estimates, COPD ranks as the fourth most common cause of morbidity and death [2]. A preventable and treatable condition, chronic obstructive pulmonary disease (COPD) is brought on by abnormalities in the airways or alveoli as a result of smoking and exposure to air pollutants. An irreversible restriction of airflow is a hallmark of COPD, which is impacted by host factors [3]. For individuals with COPD, airway obstruction is a landmark [4]. However, other complex morbidities like comorbidities disease are typically present in conjunction with it [5]. When a patient has more than two diseases, this is known as comorbidity [6], and it is

prevalent in the population with COPD [4]. Cardiovascular diseases, lung neoplasms, obesity, gastroesophageal reflux disease [7], diabetes, obstructive sleep apnea, and mental health conditions (40%) are among the most prevalent multiple morbidities linked to COPD [8,9,10]. The co-existence of COPD and cardiovascular disease (CVDs) has been extensively documented in the literature [11]. It has been shown that people with COPD have a higher chance of getting cardiovascular diseases [12]. Other comorbidities, however, seem to differ in their distribution and characteristics [12]. According to reports, COPD is complicated and encompasses a number of different phenotypes when taking into account clinical factors like survival, hospitalization, comorbidities, polypharmacy, and systemic inflammation [13].

The quality of life for people with COPD depends on the diagnosis and treatment of comorbidities [14]. Consequently, the COPD guidelines consider these comorbidities [15]. COPD is treated with bronchodilators, corticosteroids, long-term oxygen use, or pulmonary rehabilitation [16]. Nevertheless, this will also be linked to the use of additional medications to treat the comorbidity and polypharmacy, which is the concurrent use of more than five medications [17]. In general, polypharmacy is linked to a number of health outcomes problems, such as hospitalizations, adherence problems, and adverse drug reactions, particularly in older populations [4].

The quality of life (HRQoL) of patients with COPD is negatively impacted by comorbidities, polypharmacy, exacerbations, and associated hospitalization [18, 19]. In managing COPD, comorbidity and polypharmacy can be a significant burden that affects treatment outcomes and is linked to a lower quality of life [4,20]. A previous study in Bangladesh reported a prevalence rate of COPD among adults at approximately 3% in urban areas [21]. However, limited research has focused on the management of COPD in tertiary care hospitals, particularly regarding medication practices. The coexistence of COPD and polypharmacy remains an underexplored area, leaving gaps in understanding how medications are prescribed and managed in clinical settings. This study aims to assess the management of COPD by examining medication practices in a tertiary care hospital, providing insights into current prescribing patterns and identifying areas for improvement.

II.   Methodology

This research was an observational descriptive cross-sectional study aimed at evaluating the medication patterns prescribed to COPD patients. The cross-sectional nature of the study provided a snapshot of current prescribing practices and their adherence to evidence-based guidelines. The study was conducted at the Respiratory Medicine Outpatient Department of Dhaka Medical College Hospital, a tertiary-level healthcare facility located in Dhaka, Bangladesh. This hospital serves a diverse population and provides a significant representation of COPD cases in the region. The research was carried out over a period of one year, from July 2021 to June 2022. The study process began with the selection of the research supervisor and culminated in the submission of the thesis to the Dean, Faculty of Basic Science and Para-clinical Science, Bangabandhu Sheikh Mujib Medical University. The study population included patients attending the Respiratory Medicine Outpatient Department who were diagnosed with COPD by physicians. The diagnosis was based on clinical evaluation and confirmed through spirometry where available. A convenient sampling technique was utilized to select eligible patients from the outpatient department. This approach was chosen to facilitate the inclusion of participants who met the study's eligibility criteria within the designated data collection timeframe. The final sample size was determined based on the need to capture reliable and representative findings while accounting for a potential non-response rate and missing data. To enhance the study's robustness, an additional buffer of 10% was added to the initial estimate, resulting in a total sample size of 188 patients. This adjustment ensured the study had sufficient participants to achieve its objectives and maintain data quality. **Data Analysis:** The Statistical Package for Social Science (SPSS) software, version 27 (IBM Corp, Armonk, NY, USA), was used to analyze the data. The population's characteristics were displayed as mean (SD) for continuous variables and percentage for categorical variables. To find the factors that predict polypharmacy, logistic regression analysis was employed. The level of significance was predetermined at 5%, and the statistical significance was represented by a 95% confidence interval ($P < 0.05$). **Ethical approval:** The ethical clearance was taken from the ethical review committee of Dhaka Medical College, the ethical clearance no: ERC-DMC/ECC/2022/52.

III.   Result

The study sample included a total of 188 patients. The majority of the study sample were males (67%). More than 75% of the study sample were either smokers or ex-smokers. The mean age of the study were 59 years. Details of patients' characteristics are listed in Table 1. Comorbidity characteristics:The table 1 shows that cardiovascular disease is the most common comorbidity among participants (41%), followed by bronchiectasis (30.3%). Diabetes accounts for 9% of cases, while asthma is the least common, affecting 2.7%. Overall, 17% of participants reported having at least one comorbidity.

Table 1: Demographical Distribution of Respondents

Variables	Number (188)	Percentage
Age (years)		
40-50	35	18.6
51-60	67	35.6
61-70	60	31.9
>70	26	13.8
Mean±SD	59.8±9.7	
Gender		
Male	126	67
Female	62	33.0
Duration		
Less than 5	47	25.0
5 to 9	48	25.5
10 and above	93	49.5
Mean±SD	8.3±5.2	
History of smoking		
Never-smoker	38	20.2
Ex-smoker	93	49.5
Current smoker	57	30.3
Exposure to biomass fuel		
Yes	30	16.0
No	158	84.0
Co-morbidities	32	17.0
Asthma	5	2.7
Bronchiectasis	57	30.3
Cardiovascular disease	77	41.0
Diabetes	17	9.0

Medications use history: In table 2 the prescription patterns show a strong preference for inhalation therapies in COPD management. Inhaled corticosteroids (ICS) were most common (85.6%), followed by SABA (79.3%) and LAMA (77.6%). LABA was prescribed to 46.3%, while LABA+LAMA combinations (23.4%) and SAMA (21.3%) were less common. Oral corticosteroids (9.6%) and macrolides (2.7%) were rarely used, and roflumilast was not prescribed. This highlights the reliance on inhaled medications over oral therapies.

Table 2: Prescription patterns in COPD medications

Groups of medication	Number	Percentage
Short-acting Beta Agonist (SABA)	149	79.3
Long-acting Beta-Agonist (LABA)	87	46.3
Long-acting muscarinic antagonist (LAMA)	149	77.6
Inhaled corticosteroid (ICS)	161	85.6
Roflumilast	0	0.0
Macrolide	5	2.7
Short-acting muscarinic antagonist (SAMA)	40	21.3
Oral corticosteroid (OCS)	18	9.6
Combination of LABA+LAMA	44	23.4

The table 3 presents the odds ratios (OR) and p-values for various factors influencing the outcome. Males have lower odds of the outcome compared to females (OR = 0.65, p = 0.010). Individuals aged 59.8 years or older have a significantly higher likelihood of the outcome (OR = 2.45, p ≤ 0.001). Those with a COPD duration of 8.3 days or more also show higher odds (OR = 1.46, p ≤ 0.001). Current smokers have a higher probability of the outcome (OR = 1.85, p ≤ 0.001), whereas ex-smokers have significantly lower odds (OR = 0.21, p ≤ 0.001) compared to non-smokers. Exposure to biomass fuel is linked to higher odds (OR = 1.45, p ≤ 0.001). The presence of comorbidities increases the odds substantially (OR = 6.35, p ≤ 0.001), and individuals with a history of hospital admission due to COPD in the past two years have an exceptionally higher likelihood of the outcome (OR = 25.59, p ≤ 0.001). All factors, except for gender and ex-smoking status, show strong associations with the outcome, with p-values indicating statistical significance.

Table 3: Binary logistic regression analysis (N=188)

Variable	Odd ration	P value
Gender		
Females (Reference category)	1.00	0.010
Age (Standard deviation		
Age <59.8(25.3) years	1.00	≤0.001
Age ≥59.8(25.3) years	2.45(1.59-3.05)	
Duration Of COPD		

<8.3 days	1.0	
≥ 8.3	1.46 (1.19-2.59)	≤0.001
Smoking status		
Non-smoker (Reference category)	1.00	
Ex-smoker	0.21(0.19-0.39)	≤0.001
Current smoker	1.85(1.41-2.59)	≤0.001
Exposure to biomass fuel		
No (Reference Category)	1.00	
Yes	1.45(1.19-1.85)	≤0.001
Comorbidities		
No (Reference category)	1.00	
Yes	6.35(4.45-9.65)	≤0.001
Hospital admission due to COPD in the past two years		
No (Reference category)	1.00	
Yes	25.59(8.34-86.63)	≤0.001

IV. Discussion

This cross-sectional study aimed to assess the management of Chronic Obstructive Pulmonary Disease (COPD) by focusing on the medication practices at a tertiary care hospital. The findings highlight important aspects of COPD treatment, medication usage patterns, and the factors influencing medication management. COPD is a progressive respiratory disease often complicated by comorbidities such as cardiovascular diseases, diabetes, and asthma, which impact patient outcomes and treatment adherence [3,11]. This study contributes to understanding how medication practices align with current guidelines, and the variation in treatment based on patient characteristics and clinical history.

Medication Usage: The most commonly used medications in this study were inhaled corticosteroids (ICS) (85.6%) and short-acting beta-agonists (SABA) (79.3%), reflecting the standard treatment regimen for COPD in clinical practice. ICS is often used in combination with long-acting beta-agonists (LABA) or long-acting muscarinic antagonists (LAMA) to manage symptoms and reduce exacerbations [7]. The combination therapy of LABA+LAMA was prescribed in 23.4% of cases, highlighting the growing emphasis on using dual bronchodilators in more severe cases of COPD to improve lung function and symptom control [9]. However, there was a notable absence of roflumilast (0%) usage, which may reflect either a lack of awareness among clinicians about its benefits or a reluctance to use newer, more specialized treatments. Roflumilast, a phosphodiesterase-4 inhibitor, is recommended for patients with severe COPD and frequent exacerbations, but its usage may be underreported in clinical settings where access to specialized care or newer medications is limited [8]. This may suggest an opportunity to improve the uptake of advanced therapies in the management of COPD.

Influencing Factors on Medication Practices: Several patient factors influenced medication choices and practices in COPD management. Age was a significant determinant, with older patients (≥59.8 years) more likely to be prescribed complex treatment regimens (OR = 2.45, p ≤ 0.001). This is consistent with existing research that indicates older patients with COPD often experience more severe symptoms and a higher burden of comorbidities, necessitating more aggressive pharmacological management [5]. Additionally, a history of smoking, particularly among current smokers (OR = 1.85, p ≤ 0.001), was associated with more frequent use of bronchodilators and corticosteroids, reflecting the well-established link between smoking and COPD progression [13]. Patients with comorbidities were also more likely to receive complex medication regimens (OR = 6.35, p ≤ 0.001). This is in line with findings from previous studies, which emphasize the role of comorbid conditions, such as cardiovascular disease and diabetes, in exacerbating COPD and complicating its management [11,12]. For instance, cardiovascular diseases are common in COPD patients, and they often require careful consideration in prescribing medications to avoid potential drug-drug interactions and side effects [12].

Hospital Admissions and Medication Practices: The study also found that patients with a history of hospital admissions due to COPD exacerbations were more likely to receive advanced treatment regimens (OR = 25.59, p ≤ 0.001). This suggests that patients with frequent exacerbations are more likely to be given aggressive therapy in order to prevent future hospitalizations. Previous studies have shown that the prevention of acute exacerbations is a central goal in managing COPD, as these events are associated with worsened outcomes and decreased quality of life [3] (Venkatesan, 2022). The use of combination therapy and advanced medications, including roflumilast in severe cases, is integral in reducing the frequency of exacerbations [8].

Recommendations for Improvement: While the current study provides a snapshot of COPD management at a tertiary care hospital, there is potential for improvement in several areas. First, increasing the utilization of

advanced medications like roflumilast may help better manage patients with severe COPD and frequent exacerbations. Clinicians should be encouraged to explore newer treatments, especially in cases where traditional therapies have not been effective. Second, more comprehensive management of comorbidities is essential. As seen in this study, comorbid conditions significantly influence medication choices, and a holistic approach to managing these conditions could improve patient outcomes. Finally, targeted interventions to reduce smoking rates among COPD patients may prevent further progression of the disease and reduce the need for more aggressive treatments.

V.   Conclusion

This study offers valuable insights into the medication practices for COPD management in a tertiary care hospital. The findings indicate that while current treatments align with established guidelines, there is room for improvement in the adoption of advanced therapies, especially in patients with severe disease and frequent exacerbations. The management of comorbidities and smoking cessation should also be prioritized to optimize patient outcomes. Overall, these findings underscore the need for a more personalized and comprehensive approach to COPD management, one that incorporates both pharmacological and non-pharmacological interventions to improve patient quality of life and reduce the burden of this chronic disease.

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