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Original Research Article

Utilization patterns of drugs used in the treatment of chronic obstructive pulmonary disease in a tertiary hospital

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ABSTRACT

Background: Chronic obstructive pulmonary disease (COPD) is a disease where there is a limitation of airflow that comes in and out of the lungs due to some abnormalities of the lung's airway. COPD affects 10% of the global population and is associated with significant morbidity and mortality. The treatment aims to control the symptoms and achieve a good quality of life. The aim of this study is to identify the utilization patterns of different drugs used in the treatment of COPD in Sultan Qaboos University Hospital (SQUH).

Methods: This was a retrospective study that included 170 patients who received treatment for COPD. Patients' data and drugs' data were collected through accessing the TrackCare system at SQUH.

Results: The results show that 139 (81.8%) of patients were prescribed with muscarinic receptor antagonists followed by 131 (77.1%) patients who were prescribed with beta 2 receptor agonists. Salbutamol and tiotropium were the most specific drugs prescribed for 103 (60.6%) and 102 (60.0%) patients respectively. 24.7% of the patients received only one drug. There is evidence of a significant association between muscarinic receptor antagonist usage and gender.

Conclusion: This study shows the utilization patterns of drugs that were used in the treatment of COPD in a tertiary hospital.

Keywords: COPD, Corticosteroids, Muscarinic receptor antagonists, Selective beta-2 receptor agonists, Utilization patterns

INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a common disease affecting 10% of the global population and is associated with significant morbidity and mortality.^{1,2} COPD is characterized by persistent respiratory symptoms that include dyspnea, cough and/or sputum production with airflow limitation. COPD symptoms have a considerable influence on patients' activities, health status and quality of life.³

COPD is defined as being "stable" when symptoms are well managed and pulmonary decline is minimized, and "unstable" in patients who experience frequent or severe exacerbations and a faster decline in pulmonary function

and in which management can be more challenging.⁴ Pharmacotherapy for COPD is used to reduce symptoms, the frequency and severity of exacerbations and improve exercise tolerance and health status.⁵ Appropriate management of COPD can improve patient outcomes and reduce healthcare use and associated costs.⁴

Drugs used in the management of COPD include short and long-acting β -2 receptor agonists, short and long-acting muscarinic antagonists, corticosteroids, theophylline, roflumilast (phosphodiesterase 4 inhibitor), antibiotics (macrolides) and mucolytics.⁶ The aim of this study was to identify utilization patterns of drugs, beta-2 agonists, muscarinic receptor antagonists, corticosteroids and

methylxanthines, that are used in the treatment of COPD in Sultan Qaboos University hospital.

METHODS

Study design

This was a retrospective study. The ethical approval was obtained from Medical Research Ethics Committee (MREC), College of Medicine and Health Sciences, Sultan Qaboos University (MREC#2718). All the participants in this study were COPD patients who received medications from SQUH between December 2018 and July 2022.

Data collection

Data were collected from Electronic Patient Record (EPR) through accessing to the Hospital Information System (HIS) called TrackCare system at SQUH. Patients' data and drugs' data were collected.

Patients' data include age, gender, other comorbidities, other comedications. The age was divided to three subgroups, <60, 60-80, and >80 years old. Drugs' data

include group of drugs, drugs, routes of administration, number of drugs, and fixed-dose combination.

Data analysis

Data will be analysed using statistical package for the social sciences (SPSS) software with appropriate statistical tests. Variables were reported either as mean $\pm$ SD, range or as percentage.

Comparisons of the prescription of drugs between age subgroups (<60, 60-80, and >80 years old) and gender (males vs females) were done by Chi square test. $P < 0.05$ was considered as significant.

RESULTS

Table 1 shows the characteristics of the 170 patients who received medications for COPD. The range of the age of the patients was from 42-103 with a mean $\pm$ SD of 73.4 $\pm$ 11.5-year-old. 59.4% of the patients were in the 60–80-year-old age subgroup. Most of the patients were males (74.1 %).

Table 1: Characteristics of 170 patients with chronic obstructive pulmonary disease.

Parameter	Result
Age (years)	
Range	61 (42-103)
Mean $\pm$ SD	73.4 $\pm$ 11.5
Subgroups N (%)	
Less than 60	21 (12.4%)
60- 80	101 (59.4%)
More than 80	48 (28.2%)
Gender N (%)	
Male	126 (74.1%)
Female	44 (25.9%)
Smoking N (%)	
Smoker	37 (28.7%)
Ex-smoker	78 (60.5%)
Non-smoker	14 (10.9%)
Other comorbidities N (%)	
Hypertension	99 (58.2%)
Diabetes mellitus	50 (29.4%)
Asthma	28 (16.5%)
Chronic kidney disease	22 (12.9%)

Most of the patients were either ex-smokers (60.5%) or smokers (28.7%) with only 10.9% non-smokers. The most common associated comorbidities were hypertension (58.2%) and diabetes (29.4%). Figure 1 shows that the most frequently prescribed group was muscarinic receptor antagonists (81.8%) followed by beta-2 receptor agonists, corticosteroids and methylxanthines.

Table 2 shows that the most frequently prescribed drug was salbutamol (SABA) followed by tiotropium (LAMA).

There were two fixed-dose combination drugs used to treat COPD in SQUH. Seretide diskus was prescribed to 44% of the patients while 5.9% of patients received Symbicort turbuhaler.

Figure 2 shows that most of the patients received one drug (24.7%) followed by three (21.2%) and four (20.0%) medications. In regard to the route of administration, 83% of the drugs were given by inhalation, 13.9% orally and 3.1% by injection.

Table 3 shows that there was a significant difference in utilization of muscarinic receptor antagonists between males and females ($P=0.042$). However, there were no significant differences in the utilization of other groups of

prescribed drugs. Table 3 shows that there were no significant differences in the prescription of drugs for COPD between the different age groups.

Table 2: Utilization pattern of specific drugs and fixed dose combination that was prescribed to 170 patients with chronic obstructive pulmonary disease.

Drug group	Specific drug	Number (%) of patients
Muscarinic receptor antagonists	Tiotropium (LAMA)	102 (60 %)
	Ipratropium (SAMA)	50 (29.4%)
Beta 2 receptor agonists	Salbutamol (SABA)	103 (60.6%)
	Salmeterol* (LABA)	75 (44.1%)
	Formoterol** (LABA)	10 (5.9%)
Corticosteroids	Fluticasone*	78 (45.9%)
	Prednisolone	27 (15.9%)
	Budesonide**	14 (8.2%)
	Hydrocortisone	12 (7.1%)
	Mometasone	11 (6.5%)
	Dexamethasone	10 (5.9%)
Methylxanthines	Theophylline	16 (9.4%)
Drug group	Fixed dose combination	
Corticosteroids+Beta 2 receptor agonists	Seretide diskus	75 (44.1%)
Corticosteroids+Beta 2 receptor agonists	Symbicort turbuhaler	10 (5.9%)

*Part of fixed dose combination (Seretide diskus), **Part of fixed-dose combination (Symbicort turbuhaler)

Table 3: Utilization pattern of different COPD medications according to gender and age.

Gender	Muscarinic receptor antagonists	Beta-2 receptor agonists	Corticosteroids	Methylxanthine
Male	85.7%	74.6%	65.1%	7.1%
Female	70.5%	84.1%	79.5%	15.9%
P value	0.042	0.280	0.111	0.129
Age (in years)				
Less than 60	71.4%	81.0%	61.9%	9.5%
60-80	85.1%	77.2%	68.3%	9.9%
More than 80	79.2%	75.0%	72.9%	8.3%
P value	0.307	0.860	0.654	0.953

DISCUSSION

Drug utilization studies are important in facilitating rational drug use.⁷ These studies can help hospitals to evaluate and improve the prescribing and administration of medications.⁸ The results of the present study shows that incidence of COPD was higher in males than females which is in accordance with previous studies, but not with other studies in which only 50.1% patients were males.⁹⁻¹³

The present study shows that the most of the patients were either smokers or ex-smokers with only 10.9% non-smokers. This is not in accordance with a previous study that showed that 55.5% of the patients were non-smokers.⁹ The present study showed that the most prescribed group of drugs was muscarinic receptor antagonists (81.8% of patients) followed by beta 2 agonists (77.1%), corticosteroids (68.8%) while only 9.8% of patients received methylthaxines. Veettil et al, showed that, in patients with acute exacerbation of chronic COPD, inhaler

beta 2 agonists, muscarinic receptor antagonists, inhaler steroids, parenteral steroids and methylthaxines were given to 97.5%, 77.5%, 25%, 72.5% and 100% of patients, respectively.¹⁴

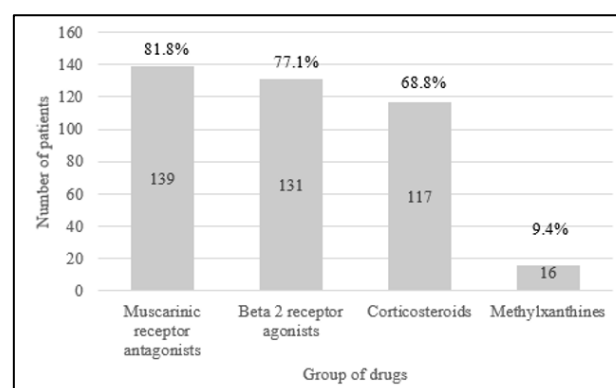


Figure 1: Utilization pattern of group of drugs.

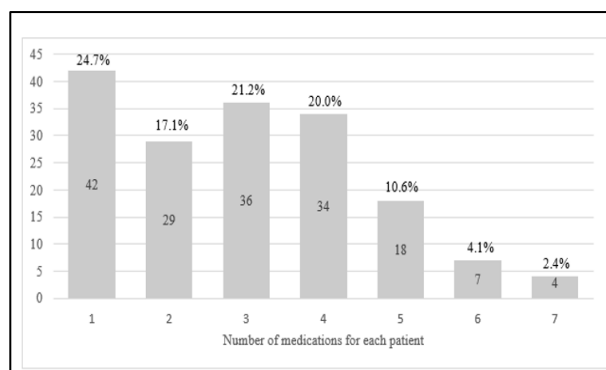


Figure 2: Number of COPD medications prescribed for each patient.

Sawant et al, showed that, in COPD patients with acute exacerbation, beta-2 agonists, muscarinic receptor antagonists, inhaler steroids, systemic steroids and methylthanthines were given to 84.5%, 84.4%, 84.5%, 73.9% and 69.7%, of patients, respectively.¹⁰ Kumar et al, showed that the most prescribed bronchodilators were beta-agonists followed by methylthanthines and muscarinic receptor antagonists.¹¹

The present study showed that SABA (salbutamol) and LABA (salmeterol and formoterol) were prescribed to 60.6% and 50% of patients, respectively. In addition, SAMA (ipratropium) and LAMA (tiotropium) was prescribed to 29.4% and 60% of patients, respectively. Miravittles et al, showed that SABA, LABA, SAMA and LAMA were prescribed to 55.3%, 55.7%, 32.1% and 32.3% of COPD patients in primary care, respectively.¹⁵ They also showed that inhaled corticosteroids, oral corticosteroids and methylxanthines were prescribed to 55.9%, 5.3% and 15.3%, respectively. Differences in prescription patterns in the different studies may be due to the difference in degree of COPD and presence of acute exacerbations. The present study shows that there was no significant difference in the prescription of COPD medications between the different age subgroups. Males received more muscarinic receptor agonists when compared to females. There were no significant differences in the utilization of other groups of prescribed drugs. On the contrary, a previous study showed that females received significantly higher number of COPD drug prescriptions than males.¹² The reason for this difference is not quite clear.

CONCLUSION

In conclusion, this study shows the utilization patterns of drugs that were used in the treatment of COPD in a tertiary hospital.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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