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Assessment of Prescription Pattern Among COPD Patients in Departments of General Medicine Ward and Pulmonology in Tertiary Care Hospitals of Khammam Region

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ABSTRACT

Chronic obstructive pulmonary disease is a common preventable and treatable disease. It has been a leading cause of morbidity and mortality in industrialized and developing countries. Drug utilization research promotes the rational use of drugs and decreases adverse drug reactions in the population. The present study is aimed to analyze and evaluate the trends and patterns of prescribing drugs among COPD patients. A prospective observational study was conducted in 301 patients admitted in the general and pulmonary medicine departments over six months at a tertiary care hospital in Khammam region. Out of the 301 study population, male patients were more (81.39%). The majority of the patients were from the age group of 51-60 years (30.56%). Smoking was found to be more prominent in the study population (63.6%). Bronchodilators (46.90%) were mostly prescribed class of drugs in the management of COPD followed by Systemic Corticosteroids (20.60%), Antibiotics (19.09%) Most common co-morbidity was found to be Hypertension (19.85%). The study concludes that symptomatic treatment was given to COPD patients in the hospital. The prescribing pattern was found to be in concordance with the current GOLD guidelines in the management of COPD patients

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INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a common lung disease in which airflow limitation is the characteristic feature (Buist *et al.*, 2007; Gershon *et al.*, 2011). 5 percent of the population was affected by COPD and is associated with a high death rate (CDC, 2011; GBD, 2017). In the US, it ranks 4^{th} place by killing more than 1, 20,000 people per year (Kochanek *et al.*, 2016). Obstructive lung disease (OLD) indicates a decreased ability to inhale or exhale air out of the lungs. The airflow reduction may be due to the shrinkage of the airways (bronchospasm), a loss of airway integrity (bronchomalacia), or a loss of elasticity of air sacs (emphysema) which lead to lowering of driving pressure (Dipiro

et al., 2009). This condition requires prolonged treatment, which may cause irrationality in drug use results prior to the disease (Mia *et al.*, 2015). As per WHO, "Chronic obstructive pulmonary disease (COPD) is a lung ailment that is characterized by a persistent blockage of airflow from the lungs. It is an under-diagnosed, life-threatening lung disease that interferes with normal breathing and is not fully reversible (WHO, 2016; Reilly, 2012).

Several studies have established that airway obstruction in COPD is due to changes affecting small airways and lung parenchyma, while the contribution of proximal airway epithelium remodeling is less clear (Hogg, 2004; Battaglia *et al.*, 2006; Sturton *et al.*, 2008). The reduced FEV1 (Forced expiratory volume) in COPD is due to the increased thickness of the walls and little airway conduction, and mucous reserves cause the obstruction of airways (Lapperre *et al.*, 2007). As it is a chronic & high prevalent disease, it requires continual intervals of physicians visit and numerous hospitalizations due to acute exacerbations and needs for long term therapy. Performing a correct diagnosis in COPD is important as appropriate treatments reduce the symptoms like dyspnea, which also decreases the number of acute exacerbations and improves the quality of health, ability to exercise and life expectancy (Rennard and Vestbo, 2006). As current and former smokers have more risk to other medical conditions to which management is distinct, and without correct diagnosis & evaluation, the symptoms are not accounted for COPD. India is a large country with vast geographical, environmental, economic, racial, religious and socio-political diversities. Chronic disease incidence, prevalence and management may be affected by these factors. Both globally and in India, Chronic Respiratory Diseases are a common cause of disease burden. About 100 million people are sufferers of obstructive lung diseases (Jindal *et al.*, 2012; Global initiative For Asthma, 2006).

There is evidence that most of the prescriptions are not in accordance with GOLD recommendations or other national guidelines resulting in high prescribing of ICS and exposing patients to more side effects (Jochmann *et al.*, 2010; Jones *et al.*, 2008; Lucas *et al.*, 2008).

Prescription pattern monitoring studies (PPMS) are drug utilization study which is an aid that mainly targets on prescribing and administering of drugs. They reduce abuse or misuse of monitored drugs and promote the appropriate use of monitored drugs. Inappropriate prescribing patterns lead to failure in therapeutic effectiveness, increased exacerbation, decreased quality of life along with higher costs. In this present study, an effort was made to study prescribing patterns considering the prescribing behavior of physicians (Faheemuddin *et al.*, 2016). The objective of this study was to assess the pattern of prescriptions among the patients admitted to tertiary care hospitals in Khammam, Telangana state, India.

METHODOLOGY

Study design and setting

The prospective observational study was conducted for 6 months, in the inpatients of pulmonology and general medicine ward of tertiary care hospitals in Khammam region. Data was collected by using the specially designed data entry form. The following information was collected for each patient: social demographics, lifestyle, smoking history, presence of comorbidities, socio-economic class, disease severity, prescribed COPD treatments and exacerbation history.

Subjects

301 COPD patients with or without co-morbidity admitted to pulmonology and general medicine department during the study period.

Inclusion Criteria

Inclusion Criteria satisfies the COPD patients of either sex with (or) without co-morbid condition admitted in general medicine and pulmonary medicine and age 18-80 years.

Exclusion criteria

Patients who refuse to participate, Pediatrics, Pregnant and lactating women were excluded from the study.

Data analysis

This data was analyzed by using Microsoft Excel and results were presented as percentages.

RESULTS AND DISCUSSION

In this study, 301 subjects were included, among them, 245(81.39%) were males and 56(18.61%) were females. The mean age of patients is 52.93 years and the standard deviation was in the range of (11.17). The results were given in Table 1 and Figure 1.

Subjects are separated according to BMI were 4(1.33%) were underweight, 221(73.42%) were normal weight, 67(22.25%) were overweight, 9(2.99%) were obese class-1. The mean BMI of COPD patients is 23.85kg/m^2 and the standard

Table 1: Mean and standard deviation of Age distribution in COPD patients

Analysis variable: Age				
N	Mean	Std Dev	Minimum	Maximum
301	52.9302326	11.1784815	19.0000000	82.00000

deviation was in the range of (2.623). The results were presented in Table 2 and Table 3.

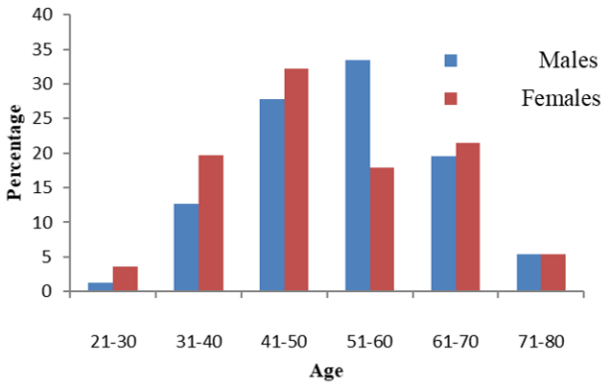

Figure 1: Age distribution of COPD patients

Among these mostly effected people were farmers, i.e., 99 (32.89%) followed by daily workers 83(27.57%), others 41(13.62%), business personals 39(12.95%), professionals 31(10.29%), unemployed 8(2.65%). On the whole 4(1.33%) have highest earnings of 51-60K, followed by 4(1.33%) with 41-50K, 13(4.31%) with 31-40K, 22(7.30%) with 21-30K, 76(25.24%) with 11-20K, 182(60.46%) with 1-10K. Out of these, the lower class is mostly effected with 177(58.80%) subjects, while 79(26.24%) were in the middle class, 45(14.95%) were in the upper class. The results were given in Table 4.

Among these, 4(1.33%) were with a mild condition, 120(39.86%) with a moderate condition, 163(54.15%) with a severe condition, 14(4.65%) with a very severe condition. The results were presented in Table 5.

Out of these, 191(63.45%) subjects are smokers, while 110(36.54%) are non-smokers, and 113(37.5%) are alcoholics and 188(62.5%) are non-alcoholics. The results were presented in Table 6.

Among these few subjects were undergone through chest x-ray and provided with impressions of pleural effusion for 27, airway blockade for 23, hyperfiltration for 3, mucous accumulation for 10, remaining 238 hadn't undergone for chest x-ray examination. The results were presented in Table 7.

Few of the patients having different allergies like allergic to change in environment 3, to drugs 1, to cold 1, to dust 2.The results were presented in Figure 2.

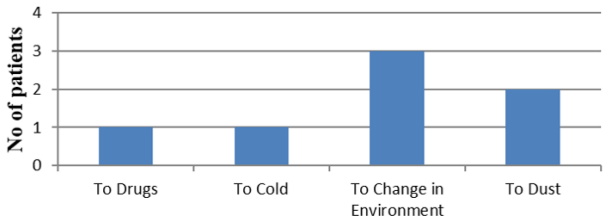

Figure 2: Incidence of COPD due to allergies

Among these, the most common comorbidity was found to be Hypertension (19.85%) and less occurred comorbidity is GERD (0.36%). The results were given in Table 8.

Pattern of drug use in COPD patients

In total 301 patients Theophylline was maximum prescribed drug n=109(18.25%) followed by Ipratropium n=79(13.23%), Azithromycin n=36(6.03%), Budesonide n=51(8.54%) ,Albuterol n=42(7.30%), Hydrocortisone n=41(6.86%) , Methyl Prednisolone n=36(6.03%), Ceftriaxone n=35(5.86%) ,Tiotropium n=34(5.69%), Dexamethasone n=24(4.09%), Prednisone n=22(3.68%), Fluticasone n=17(2.84%), Amoxicillin n=15(2.51%), Levalbuterol n=12(2.01%), Montelukast n=6(1%), Levocitrizine n=5(0.83%), Ciprofloxacin n=4(0.67%) , Formetrol n=3(0.5%), Salmetrol, Clarithromycin, Diphenhydramine were least prescribed drugs used in equal number of patients n=1(0.16%).

Under evaluation of different classes of drugs used in the therapy we found that Systemic Corticosteroids 123(20.60%) were frequently used followed by Antibiotics 114(19.09%), Anticholinergics 113(18.92%), Methylxanthines 109(18.25%), Inhaled Corticosteroids 68(11.39%) followed by Bronchodilators 58(9.71%), Leukotriene receptor antagonist were least used only in 6(1%) of patients. The results were presented in Table 9.

Along with monotherapy, some are prescribed with combination therapies. A total of 11 different combinations are used in the whole study. The most frequently used combination is Amoxicillin+Clavulunicacid in 18(31.58%) of patients. Secondly, Ipratropium bromide+Salbutamol used in 8(14.03%) patients followed by Levalbuterol sulphate+Ipratropium bromide in 6(10.53%) patients

Table 2: BMI in COPD patients

Body Mass Index	Males	Females	Total
Underweight	4(1.63%)	0(0%)	4(1.33%)
Normal weight	176(71.8%)	45(80.36%)	221(73.42%)
Overweight	56(22.9%)	11(19.64%)	67(22.25%)
Obesity class-I	9(3.67%)	0(0%)	9(2.99%)
Total	245	56	301

Table 3: Mean and standard deviation of BMI in COPD patients

Analysis of variable: BMI				
N	Mean	Std Dev	Minimum	Maximum
301	23.8523920	2.6283992	18.0900000	34.400000

Table 4: Occupational, financial, economic status, along with disease condition among COPD patients

Variable	Male	Percentage	Female	Percentage
Occupation				
Professional	26	10.61	5	8.93
Business	35	14.29	4	7.14
Farmer	88	35.91	11	19.64
Daily worker	72	29.4	11	19.4
Others	20	8.16	21	37.5
Unemployed	4	1.63	4	7.15
Total	245		56	
Income				
1-10K	139	56.73	43	76.79
11-20K	67	27.34	9	16.09
21-30K	21	8.58	1	1.78
31-40K	12	4.89	1	1.78
41-50K	3	1.23	1	1.78
51-60K	3	1.23	1	1.78
Total	245		56	
Socio-economic class				
Upper class	39	15.9	6	10.7
Middle class	67	27.3	12	21.5
Lower class	139	56.8	38	67.8
Total	245		56	

Table 5: Severity of COPD in patients

FEV 1	Male	Percentage	Female	Percentage
<80% (Mild)	2	1	2	3.5
50-80% (Moderate)	102	41.6	18	32.1
30-50% (Severe)	131	53.4	32	57.1
<30% (Very severe)	10	4	4	7.1
Total	245	100	56	100

Table 6: Classification of alcoholics in COPD patients

Smokers classification	No. of patients	Percentage
Heavy smokers	12	3.9
Light smokers	70	23.2
Current smokers	99	32.8
Former smoker	10	3.3
Non-smoker	110	36.5
Alcoholics	113	37.5
Non-Alcoholics	188	62.5

Table 7: Diagnosis tests in patients

Chest X-ray Impression	No. of patients
Pleural effusion	27
Airway blockade	23
Hyperfiltration	3
Mucous accumulation	10

Table 8: Comorbidities in COPD patients

Comorbidities	Males	Females	Total
Type 2 diabetes	37(19.4%)	7(8.53%)	44(16.27%)
Asthma	10(5.26%)	5(6.09%)	15(5.51%)
Hypertension	49(25.9%)	5(6.09%)	54(19.85%)
Gastritis	1(0.53%)	2(2.43%)	3(1.01%)
Corpulmonale	8(4.2%)	2(2.43%)	10(3.67%)
Anxiety	3(1.57%)	1(1.22%)	4(1.47%)
Emphysema	7(3.68%)	2(2.43%)	9(3.30%)
Edema	5(2.63%)	1(1.22%)	6(2.20%)
Tonsilitis	0(0%)	1(1.22%)	1(0.36%)
Bacterial Pneumonia	5(2.63%)	3(3.66%)	8(2.94%)
Gastroesophageal reflux disease	0(0%)	1(1.22%)	1(0.36%)
Depression	4(2.1%)	0(0%)	4(1.47%)
Hypothyroidism	2(1.05%)	2(2.43%)	4(1.47%)
Gallstones	5(2.63%)	2(2.43%)	7(2.53%)
Cardiovascular disease	26(13.68%)	12(14.63%)	38(13.97%)
Hyperlipidemia	3(1.57%)	9(10.97%)	12(4.41%)
Osteoarthritis	8(4.21%)	10(12.19%)	18(6.61%)
Thrombocytopenia	1(0.52%)	3(3.66%)	4(1.47%)
Thromboembolism	1(0.52%)	4(4.88%)	5(1.83%)
Insomnia	3(1.58%)	7(8.53%)	10(3.67%)
Lumbar Spondylitis	10(5.26%)	1(1.28%)	11(4.04%)
Obesity	2(1.08%)	2(2.46%)	4(1.47%)
Total	190	82	272

Table 9: Medication prescribed in COPD patients

Category	Drugs	No. of patients	Percentage
Bronchodilators			
Short-acting beta-2 agonists	Albuterol	42	7.30
	Levalbuterol	12	2.01
Long-acting beta-2 agonists	Salmeterol	1	0.16
	Formoterol	3	0.5
Inhaled corticosteroids	Fluticasone	17	2.84
	Budesonide	51	8.54
Anti- Cholinergics	Ipratropium	79	13.23
	Tiotropium	34	5.69
Methyl Xanthines	Theophylline	109	18.25
Anti- Histamines	Diphenhydramine	1	0.16
	Levocetirizine	5	0.83
Leucotriene receptor antagonist	Montelukast	6	1
Systemic Corticosteroids	Dexamethasone	24	4.09
	Prednisone	22	3.68
	Hydrocortisone	41	6.86
	Methyl Prednisolone	36	6.03
Antibiotics	Azithromycin	59	9.88
	Ceftriaxone	35	5.86
	Ciprofloxacin	4	0.67
	Amoxicillin	15	2.51
	Clarithromycin	1	0.16
Total		597	100

other combinations used an equal number of patients. The results were presented in Figure 3.

Among 301 patients Sulfonylurea was prescribed to 49(14.04%) subjects , Anti-fibrinolytics to 8(2.29%) , Diuretics to 91(26.07%), Beta-blockers to 26(7.45%) , Histamine-2 blockers to 69(19.77%), PPI'S to 23(6.59%) , NSAIDS to 33(9.45%) , Anti-pyretics to 16(4.58%) , Opiate analgesics to 2(0.57%) , Multi-vitamin to 2(0.57%) , Laxatives to 10(2.86%), Statins to 14(4.01%) , Anti-depressants, Hormones, Anti-coagulants were prescribed in equal number in 2(0.57%) patients. The results were given in Figure 4.

In this study, about 27(25%) subjects were affected with Vomiting, 22(20.37%) with Dizziness, 17(15.78%) with Abdominal discomfort, 11(10.18%) with GI disturbances,9(8.33%) with Constipation, 7(6.48%) with Diarrhea, equal no. Of patients, 5(4.62%) affected with Dry mouth, Fatigue. Chest pain and Insomnia 1(0.92%) occurred in the same number of patients. The frequency of side effects was reported in Figure 5.

Based on the data of the present study, COPD was most common among males rather than females as most of the men smoke. The highest number of COPD patients were from the age group of 41-50 years. People of age group 41-63 years are more prone to COPD. It is a condition where its symptoms take years to get developed. It mostly occurs in elderly patients as they frequently expose to smoke. In our study, 64% of patients exposed to smoke.

The most common comorbid condition in our study is HTN (19.85%), followed by DM-2(16.27%), Cor-pulmonale (13.9%). The highest number of patients is under normal weight. The mean BMI of patients is 23.85kg/m^2. COPD also causes weight loss and nutritional abnormalities. About (32.89%) patients are farmers who affected with COPD as farmers exposed to pesticides & insecticides and noxious gases, which may cause allergic reactions.

Almost (60.46%) subjects earn only 1-10K. They use tobacco, which containing a higher amount of nicotine like beedi, gutka, which easily leads to the COPD condition. In this study (58.80%), patients belonging to the lower class, who may be daily workers and labors, due to the lack of knowledge of the disease they get exposed to noxious particles.

Among 301 patients, 63 subjects undergone through

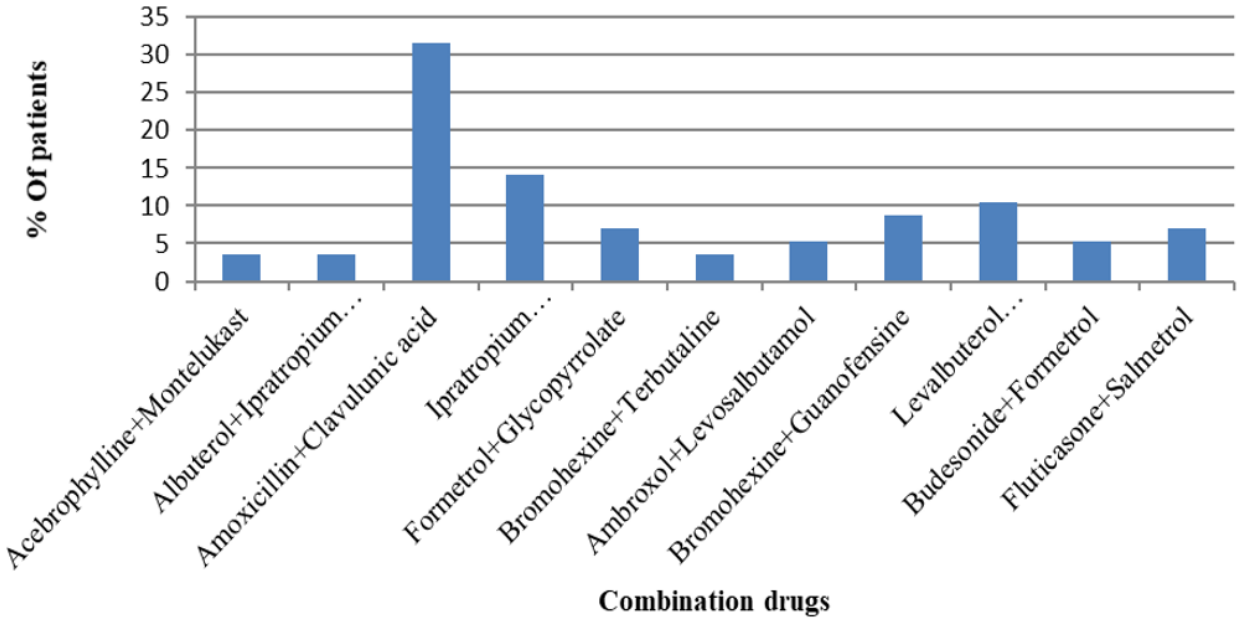

Figure 3: Drug combinations used in COPD patients

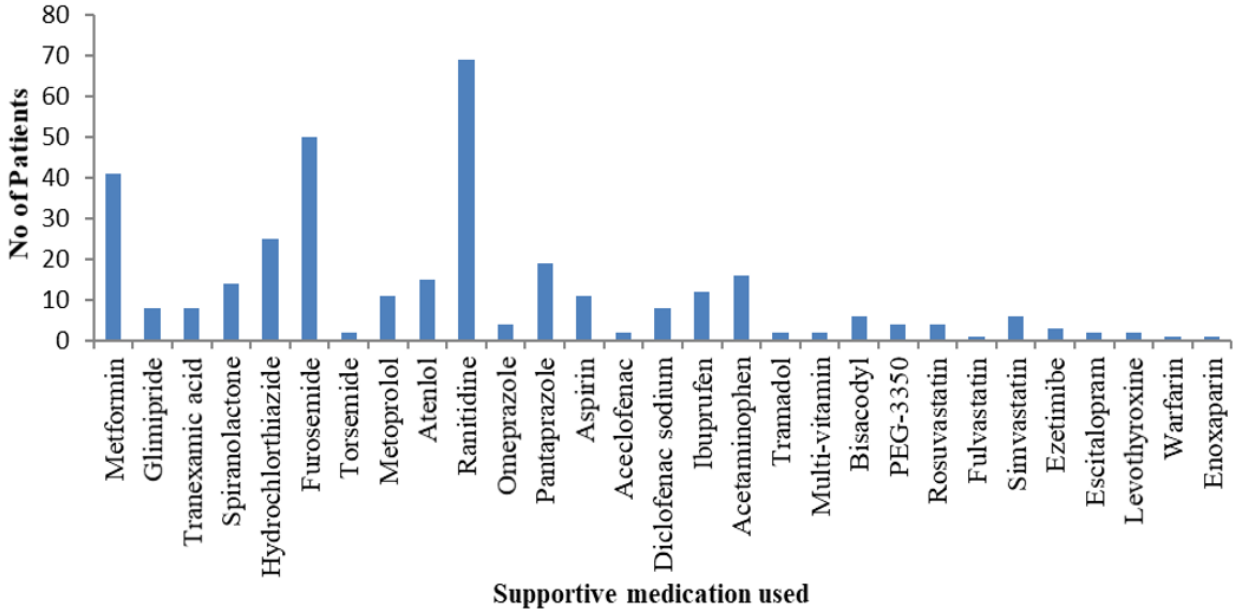

Figure 4: Supportive medication prescribed in COPD patients

chest x-ray as it doesn't give exact results when compared to spirometry. As spirometry is the mandatory test for COPD, every indidual performed spirometry. Among these (53%) are in stage-III of COPD, the majority of them are males who are current and former smokers. On the whole, alcoholics are of (37.5%). About 3 subjects are allergic to change in environment, as seasonal changes like cold conditions may also worsen the disease condition.

The maximum prescribed drug is Theophylline (18.25%), followed by Ipratropium (13.23%), which causes bronchodilation and plays a vital role in symptomatic relief. Inhaled corticosteroids Budesonide (8.54%) are third commonly prescribed, which are in accordance with GOLD guidelines and which are used to reduce the frequency of exacerbations. Systemic corticosteroids like Hydrocortisone (6.86%) are mostly prescribed, followed by Dexamethasone & Prednisone. These are in accordance with the GOLD guidelines, as they decrease the recovery time and hospital stay and improves lung function.

Short-acting beta-2 agonists Albuterol (7.3%) was

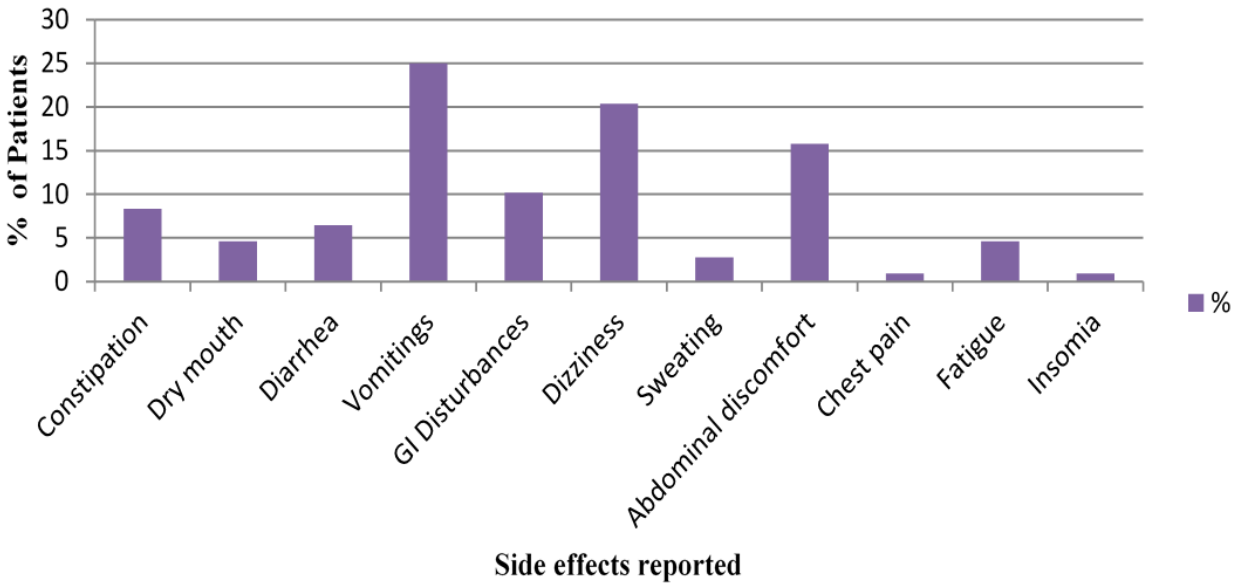

Figure 5: Drug-induced side effects reported in the study

prescribed in accordance with the GOLD guidelines, which quickly relieves the symptoms of patients. Other LABA's Formetrol (0.5%), Salmeterol (0.16%) are prescribed. Leukotriene antagonist Montelukast was prescribed to (1%) of the study group by considering the financial status of individuals.

The most commonly used Fixed-dose combinations are Amoxicillin+Clavulunic acid (31.58%), as there is a chance of occurrence of other respiratory infections followed by Ipratropium+Salbutamol (LABA+SABA) (14.03%) which causes increased bronchodilation and removes blockage of airways and ICS+LABA in (10.24%) of a study group.

CONCLUSIONS

In this study, it was found that predominantly males are affected with COPD compared to females. The majority of the drugs are prescribed in accordance with the GOLD guidelines. As a prescription containing more than 6 drugs, decreasing of drugs may help in reducing adverse drug reactions and drug interactions. In this study, the major risk factor of the disease is smoking, so patients should be counseled to quit smoking and also encouraged to use masks to prevent inhaling of noxious particles. In this study, no patient was undergone for vaccination, so it should be made available to the patients as per GOLD recommendations.

Abbreviations

COPD = Chronic obstructive pulmonary disease,

GOLD = Global Initiative for Chronic Obstructive Lung Disease,

BMI = Body mass index

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