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A COMPREHENSIVE MULTIDIMENSIONAL STUDY OF PHARMACO-ECONOMIC AND DRUG UTILIZATION PATTERN (DUR) AMONG COPD PATIENTS IN TERTIARY CARE HOSPITAL OF LAHORE, PAKISTAN

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Chronic Obstructive Pulmonary Disease (COPD), Exacerbation, Drug Utilization Review, Prescribing Pattern, Pharmaco-economic

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Abstract

Introduction:

Chronic Obstructive Pulmonary Disease (COPD) is a major global health problem especially in the developing countries. In Pakistan, physicians do not always adhere to treatment guidelines like GOLD while treating COPD. So, Drug utilization review helps to understand the prescribing pattern of physicians as well as cost effectiveness of treatment. Pharmacoeconomic aspects focuses on choosing a cheaper and more effective treatment for getting relief from COPD.

Methods:

The present study was conducted for a period of 6 months at Tertiary care Hospital of Lahore, Pakistan. A total of 166 patients were included in this study. Convenient sampling technique was used for data collection. Data were analyzed using Statistical Package for Social Sciences (SPSS) version 27.0. The Spearman's rank test was applied to analyze the differences between patient perspective and Govt perspective.

Results:

Prescribing pattern was analyzed using WHO drug use indicators and checked that how much money was spent by them for their treatment in hospital. In this study, most patients were male (75.3%) and between 51-60 years of age. The major symptoms were shortness of breath (88.6%) and cough (83.7%). Commonly used medicines include bronchodilators, corticosteroids and antibiotics. An average of 7.48 drugs were prescribed per patient and 88% of drugs were prescribed by the brand names. Cost of treatment increases with severity of the disease. For severity III, the medication cost was 3953 PKR followed by lab investigation cost was 3160 PKR and treatment cost was 7838 PKR. These values changes with severity. For all 166 patients included in this study, 86.4% of direct medical cost was supported by the government.

Conclusion:

In conclusion, most of the drugs used in our study were according to the GOLD guidelines regardless of availability of drugs and doctor recommendation.

Frontier in Medical & Health Research
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Moreover, patient with COPD attacks requires sufficient healthcare resources for treatment because COPD imparts a heavy economic burden on patients and government.

1. INTRODUCTION

Respiratory tract related diseases are a major global health problem, which contributes to high rate of morbidity, mortality, and it also increases demands for health care. (Ferkol & Schraufnagel, 2014). Both short-term and long-term respiratory diseases seriously impair physical health, also reduce work efficiency, and place considerable financial, and social strain on individuals and medical facilities. In developing countries, respiratory tract infections are further exacerbated by insufficient health care facilities, irrational drug distribution, and lack of patient awareness, leading to suboptimal therapeutic outcomes and increased health care expenses.

Chronic Obstructive Pulmonary Disease (COPD) is actually a progressive lungs disease, which is marked by chronic airflow obstruction and consistent, severe breathing difficulties. (Bove, Lavesen, & Lindegaard, 2020). The important medical events of Exacerbation of Chronic Obstructive Pulmonary Disease (ECOPD) are associated with worsening of breathing problems, increase likelihood of hospitalization, faster disease progression, and also increases risk of death. Literature studies show that exacerbations of COPD are the major contributor to health care cost of COPD, with hospital stays and the medication costs accounting for the majority of total expenditures. In developing countries, like Pakistan, where health care resources are limited, so COPD is very expensive to manage, it can be a significant financial burden on patients and also on healthcare system. (shahid Iqbal, 2020).

Beside of financial stress, pharmacotherapy is also a very important component in treatment of COPD. By analyzing medication use, it reveals the important information about how the medications are prescribed, how medication should be chosen, and also about the appropriateness of medical treatments. (Sacristén & Soto, 1994). Effective pharmacologic treatment is essential for the management of symptoms and preventing exacerbations, but deviation from proven treatment guidelines can lead to unnecessary financial burden and also contribute to the spread of antimicrobial resistance.

Constant use of medication shows a crucial role in effective treatment of chronic respiratory diseases. Studies have shown that in chronic obstructive pulmonary disease (COPD), frequent exacerbations, higher hospitalization rates and lower treatment efficacy is linked with inadequate patient compliance. There are various factors, including complex medication schedules, lack of patient understanding, adverse drug reactions, and financial issues, that often lead to inadequate adherence, especially in long-term treatment. (Parthasarathi, Nyfort-Hansen, & Nahata, 2004).

Although many studies conducted individually to analyze prescribing pattern and economic impact, these all studies are rarely combined in a single research study. So, study related to pharmaco-economics have focused on estimating the direct medical and non-medical expenses related with acute episodes of chronic obstructive pulmonary disease (ECOPD), identifying hospitalization and drug therapy as the major contributors to overall costs. On the other hand, drug-use studies focus on determining indicators and prescription pattern of drugs.

In developing countries, the absence of integrated, multidisciplinary research is especially noticeable because health care facilities, medication practices, and patients' financial situations are greatly different from those in developed countries. (Veettil et al., 2012) (Bove, Lavesen, & Lindegaard, 2020). Therefore, there is critical need for research that comprehensively evaluate all aspects to promote appropriate medication use, make better use of limited resources, and improve the overall quality of patient care.

To address all the research gaps, the current research uses a comprehensive framework that includes three interconnected goals. The primary goal is to examine patterns of medication use and

Frontier in Medical & Health Research
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to evaluate the prescribing patterns among patients with COPD. The secondary goal is to estimate or analyze the direct medical and non-medical expenses associated with COPD, in order to evaluate the financial stress on both patients and the health-care system.

This research study aims to provide a clear understanding of COPD management by integrating clinical findings, economic evaluation and patient-related outcomes through an integrated investigation. This research offers to support policymakers and health-care practitioners in validating evidence-based prescribing patterns, emphasizes the role of strategies that improve treatment adherence, and developing cost-effective patient focused interventions to improve outcomes in COPD.

2. Methodology

Study Design

An observational cross-sectional study was conducted to evaluate the drug utilization trends in respiratory tract infection and Pharmacoeconomic analysis in COPD patients over a 6-month period. The study design was selected to evaluate changes in drug utilization trends and Pharmaco-economics, following structure pharmaceutical care in a real-world setting.

Study Setting and Population

The study was carried out in selected tertiary care hospitals of Lahore, Pakistan. These hospitals provide specialized patient care and clinical services to patients with chronic obstructive pulmonary disease (COPD) particularly those with limited asses to specialized pulmonary healthcare.

Inclusion Criteria

Adult patients with age above 18 years, admitted in Hospital, with a confirmed diagnosis of COPD and who visited the hospital for acute exacerbation were considered eligible for inclusion. Smokers and alcoholics are also included in the study.

Exclusion Criteria

Patients diagnosed with pleural effusion and lung cancer are excluded from the study. Pregnant woman who are terminally ill, children and neonates, are also excluded from study. Written informed consent was signed from all participants before enrollment.

Sample Size and Sampling Technique

The sample size was calculated using OpenEpi to detect a statistically significant improvement in drug utilization trend and pharmacoeconomic analysis assuming a 5%margin of error and 95% confidence level. A total of [n = 166] patients were recruited using a convenience sampling technique during routine hospital visits.

Data Collection and Outcome Measures

A data collection form was specially designed to collect all patient data. It consists of 4 sections. First section includes demographic details like age, gender, marital status, education level, residence. Second section consists of further 4 sub-sections. First sub section includes 8 questions for evaluating patient clinical and medical information such as primary diagnosis, type of COPD, co-morbidities, symptoms on admission, duration of illness, family history, smoking status, and allergies. Second subsection consists of 4 questions for assessing patient social and lifestyle history such as smoking history, tobacco use, alcohol use, exercise or physical activity. Third subsection consists of 8 columns for evaluating the prescription and drug utilization details in COPD patients it includes drug name, brand or generic, drug class, dosage form, route, dose, and frequency. Fourth subsection utilizes WHO core drug use indicators for evaluating prescriptions details consists of 4 questions which includes average number of drugs per prescription, percentage of prescriptions with antibiotics, percentage of prescriptions with injections, percentage of drugs prescribed by the brand name. Third Section consists of further 4 subsections. First subsection including 3 questions related to patient clinical information which includes severity of exacerbation, major symptoms, chief complaints

Frontier in Medical & Health Research
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and co-morbidities. Severity level of COPD was analyzed using Modified Medical Research Questionnaire (mMRC). Second subsection consists of 3 questions for evaluating direct medical cost including lab cost, medication cost and treatment (oxygen, nebulizer) cost. Third subsection consists of 3 questions for evaluating direct non-medical cost which includes transportation, food and other costs. Fourth subsection consists of 2 questions for evaluating cost summary related to government perspective and patient perspective.

Data Analysis

The data were analyzed using the tool named Statistical Package of Social Sciences (SPSS) version 27.0. Descriptive analysis was employed to summarize demographic, clinical, pharmacological data of COPD patients. Continuous variables such as age and cost variables were expressed as mean ± standard deviation. Categorical variables including gender, smoking status, COPD severity, comorbidities, and medication utilization patterns were summarized using frequencies and percentages. Correlation between government perspective and patient perspective were analyzed using Spearman's rho correlation test.

Ethical Considerations

Ethical approval for the conduction of the study was obtained from the institutional ethics review (IRB) committee of tertiary care Hospital, Lahore. All protocols and study procedures were followed and the confidentiality of participants information was strictly maintained throughout the study.

3. Results

3.1 General Characteristics of study population

In 166 of the prescriptions, a total of 1243 drugs were prescribed for COPD. For each individual patient, socioeconomic status, gender, smoking history, residence, family history, specific as well as comprehensive disease history and literacy status were analyzed.

As it was determined that the prevalence of chronic obstructive pulmonary disease (COPD) is 75.3% in men compared to just 24.7% among females when stratified by gender. Patients in the study most commonly belonged to the age groups of 51 to 60 years (28%) and 61 to 70 years.

Regarding Social characteristics of the patients in our study, 33.7% (includes currents and reformed smokers) of the total study population were smokers, 4% had alcohol consumption, while rest 7% were tobacco users. Among these study patients, 9% were current smokers and majority 24.7% of them were ex-smokers.

The patients' Literacy status about the disease and medication therapy showed that, 32.9% were illiterate concerning their disease and has been taking drug and 67.1% of patients were literate regarding the disease and drug regimen taken.

Among study population, 73.5% of study participants are living in urban areas and 26.5% are from rural areas. With respect to the family history of COPD, only 1.8% of study population had a family history of COPD as shown in [Table 1].

Table 1: General Characteristics of study population

Parameters	Percentages (%)
Gender wise percentage distribution of study patients	Male: 75.3% Female: 24.7%
Age in Years	21-30: 3% 31-40: 6% 41-50: 14% 51-60: 28% 61-70: 28% 71-80: 16% 81-90: 5%
Social status of study patients	Smokers: 33.7%

Frontier in Medical & Health Research
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	Alcohol Consumer: 4% Tobacco consumer: 7%
Status of patients with smoking history	Current Smoker: 9% Ex-Smoker: 24.7%
Literacy status of study population	Illiterate: 32.9% Literate: 67.1%
Residence	Urban: 73.5% Rural: 26.5%
Family History of COPD	Yes: 1.8% No: 98.2%

3.2 General characteristics of study population based on Severity of Exacerbation

The demographic characteristics of study participants are classified on the basis of disease severity are shown in Table 2. A total of (n=166) patients with acute exacerbation of COPD were selected for the study and majority of study population was male (75.3%), smokers were (33.7%). Additionally, majority of the participants were of old age (mean age of 59.9 ± 13.6).

Table 2. Demographic characteristics of study participants

Patient Characteristics (n=166)	Severity of Exacerbation		
	III	II	I
Gender			
Male	46	60	19
Female	24	14	3
Age (mean ± SD)	61.2±12.06	59.1±15.1	58.1±13.2
Marital Status			
Yes	161	72	20
No	5	2	2
Smoking			
Yes	22	25	9
No	48	49	13
Comorbidities			
Yes	41	47	15
No	29	27	7

Table 3 describes patient's chief complaints. Among COPD patients, cough accounts for 83.7%, shortness of breath (88.6%), fever (40.4%), expectoration (24.1%) and wheezing (10.8%) as presenting complaints.

Table 3. Chief complaints among COPD patients

Chief Complaints	Number (%)
Cough	139 (83.7%)
Shortness of Breath	147 (88.6%)
Expectoration	40 (24.1%)
Wheezing	18 (10.8%)
Chest pain	21 (12.7%)
Fever	67 (40.4%)

Frontier in Medical & Health Research
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Chest tightness	3 (1.8%)
Weight loss	5 (3%)
Constipation	3 (1.8%)

Table 4 explains the list of major comorbidities among COPD patients. Among them, main comorbidities were hypertension which accounted for 45.8% and diabetes mellitus 30.7%.

Table 4. List of comorbidities among COPD patients

Comorbidities	Number (%)
Diabetes Mellitus	51 (30.7%)
Hypertension	76 (45.8%)
Asthma	7 (4.2%)
Tuberculosis	12 (7.2%)
Bronchitis	2 (1.2%)
Pneumonia	4 (2.4%)
Hepatitis	5 (3%)
Ischemic Heart Disease	24 (14.5%)
Coronary Artery Disease	5 (3%)

Among the study population, 62% of COPD patients are presented with comorbidities, out of which hypertension (31.1%) was the most common co-morbidity in this analysis of prescription with COPD, accompanied by hypertension with diabetes mellitus (15.5%), asthma (2.9%), Tuberculosis (5.8%), diabetes mellitus (12.6%), hypertension with ischemic heart disease and diabetes mellitus (14.6%), pneumonia (1%). [Table 5].

Table 5: Types of Co-morbidities with COPD among study participants.

Co-Morbidity	Number of Prescriptions (N=166)	Percentage (%)
COPD + HTN	32	31.1
COPD + DM	13	12.6
COPD + DM + HTN +TB + Pneumonia + Bronchitis	2	1.9
COPD + Asthma	3	2.9
COPD + TB	6	5.8
COPD + DM + HTN + IHD + CAD	1	1
COPD + DM + HTN	16	15.5
COPD + IHD	2	1.9
COPD + Pneumonia	1	1
COPD + HTN +Asthma + TB	1	1%
COPD + DM + HTN +CAD	2	1.9
COPD + DM + HTN +IHD	15	14.6
COPD + HTN + CAD + IHD	1	1
COPD + HTN + IHD	2	1.9
COPD + HTN + TB	1	1
COPD + HTN + HCV	2	1.9
COPD + Asthma + TB + HCV	1	1

Frontier in Medical & Health Research
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COPD + DM + HTN + Asthma	1	1
COPD + Pneumonia + IHD	1	1

COPD= Chronic Obstructive Pulmonary Disease, HTN= Hypertension, DM= Diabetes Mellitus,
TB= Tuberculosis, IHD= Ischemic Heart Disease, CAD= Coronary Artery Disease, HCV= Hepatitis C Virus

A total of 166 cases of patients diagnosed with COPD were collected and analysed in accordance with the WHO prescribing drug use indicators. The final interpretation is as follows:

Table 6: WHO Prescribing Indicators of Drugs

Core Drug Use Indicators	Total number and Percentage
Average number of drugs per prescription	7.48 drugs (A total of 1243 drugs were given to 166 patients)
Percentage of prescriptions with antibiotics prescribed	90% (Out of 166 prescriptions, 150 prescriptions were resulted in Antibiotics prescribed)
Percentage of prescriptions with injection prescribed	88% (Out of 166 prescriptions, 146 prescriptions were resulted in injections prescribed)
Percentage of drugs prescribed by the Brand names	88% (Out of 166 prescriptions, 1094 drugs were prescribed by brand names)

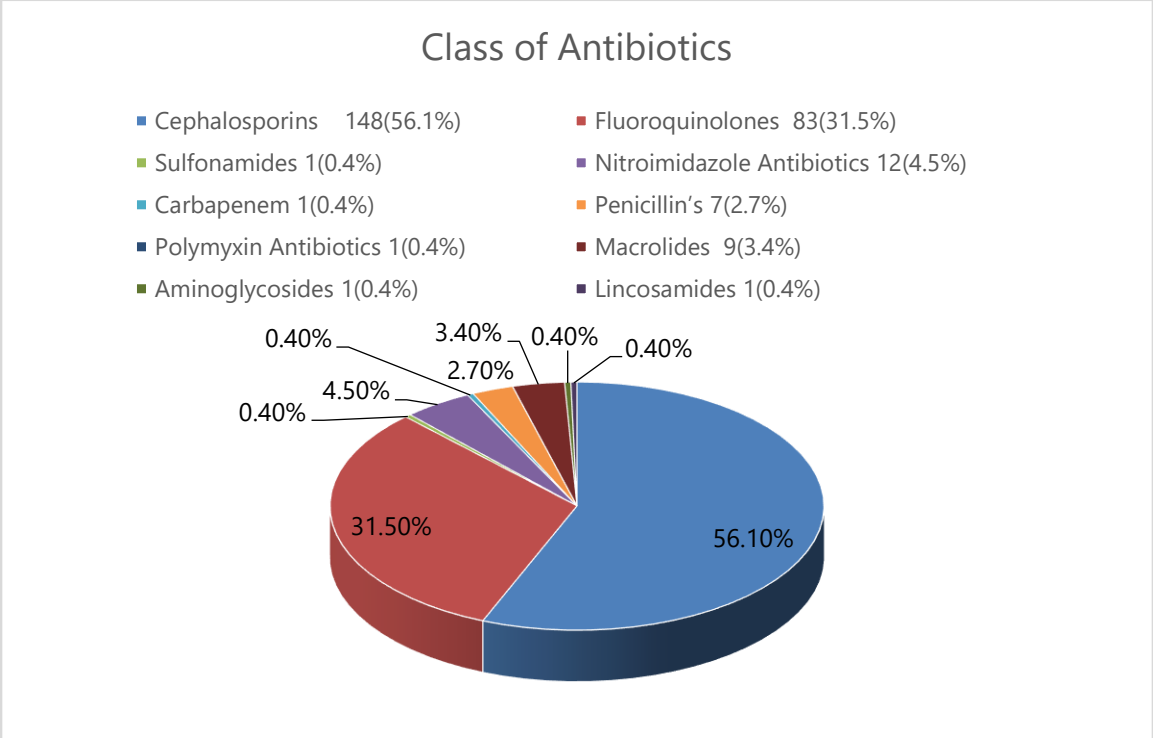

Fig 1: Percentage of different Class of Antibiotics used during study. The most commonly used antibiotics were Cephalosporins 148(56.1%) and Fluoroquinolones 83(31.5%) respectively.

In the present study a total of 1243 drugs were prescribed to 166 patients with COPD. Out of total, 237 bronchodilators (19.1%), 264 antibiotics (21.3%), 180 corticosteroids (14.5%),

Frontier in Medical & Health Research
ISSN: (e) 3007-1607 (p) 3007-1593

132 Proton Pump Inhibitors PPIs (10.6%), 80 Antihypertensives (6.4%), 24 Antidiabetics (1.9%),89 Analgesic and Antipyretic (6.8%), 48 NSAIDs (3.9%),34 Anti-histamine(2.8%), 18 Anti-emetic (1.5%),5 Multivitamins (0.5%), 30 Anticoagulants (2.4%), 38 Statins (3.1%), and 64 others (5.2%) respectively.

Table 7: Patterns of Drug prescription (n=1243)

Category of Drugs	No. of Drugs Prescribed (%)
Bronchodilator	237(19.1%)
Antibiotics	264(21.3%)
Corticosteroids	180(14.5%)
Proton Pump Inhibitors (PPIs)	132(10.6%)
Anti-hypertensives	80(6.4%)
Anti-diabetics	24(1.9%)
Analgesic and Antipyretics	89(6.8%)
NSAIDs	48(3.9%)
Anti-histamines	34(2.8%)
Anti-emetics	18(1.5%)
Multivitamins	5(0.5%)
Anti-coagulants	30(2.4%)
Statins	38(3.1%)
Miscellaneous (others)	64(5.2%)

3.3 Cost Analysis

The cost analysis for ECOPD severity patients according to Anthonisen criteria is shown in Table 8. The mean of direct medical and direct non-medical costs for severity III, II and I was 16,314, 11,879 and 11,977 PKR respectively. Medication cost, accounts for 3953 PKR, is the major cost in direct medical costs, followed by treatment cost was 7838 PKR (oxygen, nebulizers) and lab investigation cost was 3160PKR for severity III. Furthermore, for severity II, medication cost was 5032 PKR, treatment cost was 1357 PKR and lab investigation cost was 4331 PKR. All of these costs were significantly altered with severity of disease.

Table 8. Direct medical and non-medical costs among acute ECOPD patients

Severity of Exacerbation	No. of patients (%)	Lab investigation cost	Medication cost	Treatment cost (oxygen, Nebulizers etc.)	Transportation cost	Food cost	Total costs
III	70 (42.2)	3160.61	3953	7838.71	585.39	776.43	16314.14
II	74 (44.6)	4331.08	5032.57	1357.3	543.24	614.86	11879.05
I	22 (13.2)	4931.82	5586.36	268.18	638.64	552.27	11977.27

The cost values are expressed as Mean and calculated in PKR

In Table 9, sum of direct medical cost are taken as Govt. perspective whereas sum of direct non-medical costs is considered as patient perspective. The sum of direct medical and non-direct medical cost according to three disease severity for COPD patients are represented. The sum of direct medical costs as Govt. perspective for severity III, severity II and severity I were estimated to be 14952 PKR, 10720 PKR and 10786 PKR respectively. Whereas, the sum of direct non-medical cost as patient perspective for severity III, severity II and severity I was estimated

Frontier in Medical & Health Research
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to be 1361 PKR, 1158 PKR and 1190 PKR respectively. For these 166 patients, up to 86.4% of direct medical costs was supported by the government.

Table 9. Govt Perspective vs patient perspective costs among acute ECOPD patients

Severity of Exacerbation	No. of patients (%)	Govt. Perspective	Patient Perspective	Percentage of costs supported by Government
		Sum of direct medical costs	**Sum of direct non-medical costs**	
III	70 (42.2)	14952.32	1361.82	86.4
II	74 (44.6)	10720.95	1158.1	82.3
I	22 (13.2)	10786.36	1190.91	77.3

The cost values are expressed as Mean and calculated in PKR

3.4 Statistical Analysis

In Table 10, Spearman correlation test was applied to applied to show the correlation between Govt perspective and patient perspective and significant difference with (p-value < 0.05) was observed.

Table 10. Correlation between Govt. perspective and patient perspective

	Govt. perspective	Patient Perspective
Severity III		
Spearman rho	0.473	0.094
P-value	0.001	0.001
Severity II		
Spearman rho	0.682	0.123
P-value	0.001	0.001
Severity I		
Spearman rho	0.239	0.043
P-value	0.001	0.001

Discussion:

Drug Utilization studies are important because they help to ensure the rational use of drugs. (Mittal et al., 2014). These studies also help hospitals to evaluate that how medicines are prescribed and given to the patient. (Kaur et al., 2014). In this study, a number of 166 patients were included in this study to assess how drugs are prescribed using WHO guidelines.

Among the study population, 75.3% were male and 24.7% were female. The result is similar to previous studies by (Afonso et al., 2011) where more males were affected. (Omachi et al., 2010) Age groups that are mostly affected with COPD were 51-60 years which is similar to the previous study done by (Beg et al., 2017) representing that older persons are at greater risk of developing COPD. When analyses the literacy rate of study population, we found that only 32.9% of patients were illiterate about the disease and medications prescribed to them and remaining 67.1% have understanding of disease and medications.

In this study of 166 patients, 54.3% of patients had only COPD, while 45.7% had COPD along with other comorbidities. Among these comorbidities, 55.3% had one additional comorbidity while 44.7% had two or more comorbidities. The most common comorbidity was hypertension (31.1%). This result is similar to the other studies where common comorbidities are hypertension, diabetes mellitus and alcohol consumption. Unhealthy lifestyle, old age and stress are the conditions that can leads to the worsening of heart and lung function

Frontier in Medical & Health Research
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and increase the risk of developing COPD. (Kaur et al., 2014).

COPD is difficult to treat because of several risk factors. In present study, the main risk factor includes smoking, tobacco use and alcohol consumption. Out of 166 patients, 33.7% were smokers (includes both current and ex-smokers). The result is similar to the earlier research by (Mahmoodan, Mahesh, & Ramdurga, 2017).

In present study, each prescription contains about 7.48 drugs which is similar to the previous research by where each prescription had 6.92 drugs. Also, 88% of drugs were prescribed by the brand names which is similar to the earlier studies by (Beg et al., 2017).

In present study, Antibiotics were most commonly prescribed medicines (n=264) which matches with the earlier research by (Beg et al., 2017) (Mahajan et al., 2014). Among Antibiotics classes, cephalosporins were most commonly used class of antibiotics which is similar to the previous study by (Errabelly et al., 2015).

The most common combinations of drug used were Budesonide + Formoterol Fumarate which is not similar to earlier research by (Beg et al., 2017) where salbutamol + Ipratropium bromide and Piperacillin + Tazobactum are commonly used drug combinations.

COPD is a big social burden for the developing countries in terms of cost whether it is the direct medical cost or the direct non-medical cost. But government plays a major role for relieving the patients economically so that they can get their treatment on a better ease. In this study, the mean cost of acute exacerbation of chronic obstructive pulmonary disease (ECOPD) per patient was around 11977.27 PKR. If the difference arises in the cost with some other countries that can be due to the organizational structure of the hospitals and the healthcare systems and changes in the economic conditions of the country and governmental relief for the patients (Wouters, 2003) (Alam, 1998). As we live in Pakistan so there is a lower cost of acute ECOPD as compared to the other developed countries. (Jahnz-Różyk et al., 2011) (Ramanath & Sabith, 2012).

Every country has its own cost of ECOPD treatment depending upon the circumstances of the healthcare system of that country (Ahmad et al., 2005) (Örnek et al., 2012). For this study, it involves a greater impact of the direct medical cost. For the better result, the findings of this study are according to the past studies conducted in the China and turkey, where there is a greater impact of drug cost of about 53.5%, 71.2% respectively for the mean cost (Hong & HUANG, 2008) (Ozkaya, Findik, & Atici, 2011). But in India, it was about 9.1% (Veettil et al., 2012) (Jahnz-Różyk et al., 2011). All these countries have a distinguishing result for the cost is due to the difference in medicine prices, laboratory testing prices and techniques, generic medicines availability and the overall structure of the healthcare system.

This study also showed the differences between the direct medical and direct non direct medical cost which are borne by the patients in Pakistan. This study shows that if patients get treated in the government hospital for the treatment of acute ECOPD most of its cost of treatment is paid by the government. For reference, in Pakistan the patients with severity I paid only 1190.91 PKR while the actual cost for this was about 10786.36 PKR that shows that government supported and paid about 77% of the total cost for the patient wellbeing. The cost that was paid by the patients was the food and transport cost that was very little of the total.

The studies from the Greece and China also supported the fact that the cost for the treatment of the disease increases with the alterations in the severity of the disease (Hong & HUANG, 2008) (Geitona et al., 2011). As referred before, Andersson et al. also confirmed that treatment cost of COPD changes with the changes in severity of disease. According to them, the treatment cost for mild cases was around 3221 PKR, while for the mild to moderate cases it turned out to be 9503 PKR, for actual moderate cases it increases to about 56676 PKR, and last for the severe cases it is about 586691 PKR (Andersson et al., 2002). In another referring article Hilleman et al. also confirmed that there is a direct link between the treatment cost and

Frontier in Medical & Health Research
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severity of the diseases, that also confirms that the cost will surely be increased with the changes in severity of the diseases specifically ECOPD. (Hilleman et al., 2000) All results of these studies especially relate to the results of our study. Based on previous studies and our study results, it shows that severe conditions lead to a higher direct medical cost. This is because of the longer hospital stays, more requirement of medications and larger number of lab tests for the treatment of acute ECOPD. This study shows a better result in contrast to the previous studies because previous studies used the data from the healthcare databases while this study directly monitors the direct medical and direct non-medical cost by following the patients during their stay in the hospital.

Limitations:

This study includes total 166 patients, despite the small sample size of participants, it still gives impactful results and findings. By increasing the number of participants in the future, it would result in better understanding of real impact of disease on the patients. This study includes the participants who were chosen using convenient sampling techniques and selected on the easiness of the patients, so this reflects the biasness because this is unable to represent the whole population properly.

Conclusion:

As COPD is difficult to treat, so, medication adherence is an important element for the success of treatment. In this study, the common medications used for COPD were corticosteroids along with antibiotics. As a result, it was found that most of the drugs used were according to the recommended GOLD treatment guidelines. ECOPD could result in the sudden and severe worsening of the lungs that can even lead towards the death. Increased severity should require more healthcare resources which could have a major impact on the healthcare system. This will put burden on the hospitals as well as government. By preventing and reducing the cases of COPD and by stopping the disease before it gets worse, number of cases will decrease, and all these consequences can help to reduce the overall economic burden on government and hospitals.

Future Scope of Study:

This study will be helpful for doctors to understand how drugs are prescribed. Pharmacoepidemiological studies can be helpful to study about drugs and their effects in a large number of populations. In future, for better results of pharmacoeconomic evaluation, the study should be conducted in different cities and different hospitals of that study including the private hospitals as well, so that comparison can be made and give more accurate results.

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