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Assessment of Disease Severity and Medication Adherence in Chronic Obstructive Pulmonary Disease In-Patients at a Tertiary Care Hospital

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ABSTRACT

The GOLD guidelines defines (COPD) as "a disorder nation characterized through airflow issue that isn't reversible. The study was carried out to assess the drug utilization in COPD patients by medical practitioners and to improve clinical symptoms and quality of life and to assess the COPD Assessment Test (CAT) score and Modified Medical Record Council (MMRC) grade in COPD patients. A prospective observational study was carried out to analyze cases of male and female in-patients with COPD in the departments of general medicine. In our study we selected 65 patients randomly, outof which 5 patients were excluded from our study. Participated patients completed CAT score and MMRC grade questionnaires.Out of 60 patients, smokers have higher exposure to get COPD. Xanthene derivatives were predominant in prescriptions; dominating the therapy. Salbutamol remains the first line drug of choice. Formoterol and budesonide were used only in severe cases and was found to be more effective in achieving target in hospitalized patients.The maximum improvement in the symptoms of disease (CAT Score) was found with Bi therapy (Xanthene derivatives and Sympathomimetics) also, the severity of disease (Dyspnea Score) was found to be improved with Bi therapy(Steroids and Sympathomimetics).

KEY WORDS : Pulmonary disease, Drug therapy, CAT score, MMRC grade.

I. INTRODUCTION

COPD incorporates various organizations of scientific syndromes that percentage the not unusual place characteristic of issue of expiratory airflow [1]. The American Thoracic Society defines COPD in phrases of continual bronchitis and emphysema [2].

The GOLD initiative gives a definition for COPD as a disorder nation characterized by airflow problems that are not reversible. The airway issue is generally modern and related to an uncommon inflammatory reaction of the lungs to noxious debris or gases [3]. Approximately 20% of adult men and 5% of adult women have chronic bronchitis, but only a minority of them develop serious disabling COPD or cor pulmonale. Quite frequently, chronic bronchitis is associated with emphysema [4].

The two most important etiologic factors responsible for the majority of cases of chronic bronchitis are cigarette smoking and atmospheric pollution. Other contributory factors are occupation, infection, familial and genetic factors. The WHO has described pulmonary emphysema as a combination of permanent dilatation of air spaces distal to the ending bronchioles and the destruction of the walls of dilated air spaces. Since the two conditions coexist frequently it is 'predominant emphysema' and 'predominant bronchitis' [5].

Diagnosis involves Arterial blood gas (ABG) analysis gives the best ideas as to acuteness and current condition of disease exacerbation. It is also recommended for patients whose oxygen saturation level in pulse oximetry is below 92% [6]. Determine alpha1-antitrypsin (AAT) in all patients below 40 years, in those with a family history of emphysema at an early age, deficiency is confirmed when the value is below 11mmol/L. In persons with stable chronic bronchitis, the sputum is filled with phlegm and macrophages are the predominant cells. An increase in the quantity of sputum production is a sign of an AE. Some organisms

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such as Streptococcus pneumoniae and Haemophilus influenza, Pseudomonas aeruginosa, and Moraxella catarrhalis are common organisms seen. Pulmonary function tests are crucial for the diagnosis and investigation of the condition of disease. FEV1 is a reproducible that is a commonly used index of airflow obstruction. FEV1 (mild ≥80% predicted, moderate 50-80%, severe 30-49% predicted, very severe <30% predicted) [7]. The delaying disease progression**,** Lowering mortality, Minimising future risk for exacerbations, and Lessening the severity of existing symptoms [8]. Non-pharmacological treatment includes Smoking cessation, Pulmonary rehabilitation, Immunization, Non-invasive ventilation, Long-term oxygen therapy, Extracorporeal membrane oxygenation, Lung volume reduction surgery (LVRS), and endobronchial procedures, and Lung transplantation.

According to the Global Initiative for Chronic Obstructive Lung Disease (GOLD) recommendations, bronchodilators should be the cornerstone of COPD treatment and can be taken orally or by inhalation [9]. Antimuscarinic bronchodilators such as Ipratropium aerosol inhalation, and tiotropiumbromideare thought to be more efficient for COPD than for asthma. Umeclidinium bromide and glycopyrronium bromide are the new LAMA developed for the treatment of COPD. Theophylline, a methyl xanthine, relaxes airway smooth muscle by primarily inhibiting phosphodiesterase (PDE) isoenzymes.

ICS such as Beclomethasonedipropionate, budesonide, flunisolide, fluticasone propionate, and triamcinolone acetonide are some of the currently accessible inhaled glucocorticoids. Prophylactic antibiotics and chronic antibiotic therapy had almost no influence on the incidence of exacerbations in COPD, according to several large-scale controlled trials. Mucolytic medications including ambroxol, erdosteine, carbocysteine, and iodinated glycerol reduce the frequency of exacerbations in chronic bronchitis. N-acetyl cysteine, an antioxidant and mucolytic, has been shown in most clinical trials to decrease the frequency of COPD exacerbations [10].The purpose of the research is to evaluate the efficacy and appropriateness of various drugs in relation to disease severity among patients with COPD, aiming to optimize therapeutic strategies and improve patient outcomes

II. METHODS AND MATERIALS

2.1. Sample size

For conducting a new study to assess the drug utilization evaluation in COPD patients, minimum [60 subjects] will be required.

2.2. Study design

A Prospective observational study involving collection of data from patient case sheet those who are admitted in general medicine department

2.3. Study duration

The study is to be conducted over a period of 6 months.

2.4. Study instruments

- Questionnaire :–
  - ➢ It is the commonly used instrument for collecting data from the participants of the study. It consists of a set of structured questions designed to obtain data from the respondents which include CAT Score and MMRC grade questionnaires.
  - ➢ Based on the GOLD document COPD patients are considered at increased risk, when their CAT and MMRC values are greater than 10 and 2, respectively. Accordingly, we subdivided the patients into two subgroups, by choosing the cut off points of ≥ 10 for the CAT and of ≥ 2 for the MMRC scale [11].
- Interview-It is a measurement instrument otherwise known as oral questionnaire. It involves a process where we solicit information from respondents through verbal interaction.
- Observation-This is an instrument that is employed by us in which an individual behaviour or situation is observed and recorded.

2.5. Complete study procedure

- A prospective observational study was carried out to analyse cases of male and female in-patients with COPD in the departments of general medicine
- Patient demographic details, treatment profile were analysed and the reports were recorded.
- Convenient sampling was used to recruit all eligible patients and a validated data collection form was used to collect data from the patients.
- The data collection form provides the information regarding the demographic details of the patient which includes age, sex, past history, family history, medication history and treatment giving to the patient.
- History regarding presence of any risk factor like history of allergy to dust mite, drugs, food, smoker in family as well as triggering factor

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like viral infection or other factors for acute exacerbation of COPD was asked.
- Detailed general and systemic examinations were done to assess grades of severity of respiratory distress of COPD.
- Participants were inquired about their understanding while completing the form.
- Their feedbacks were then used to improvise data collection for their easy understanding**.**

2.6. Patient selection

Inclusion criteria
- COPD patient who have been admitted in the hospital.
- COPD patient who are willing to participate in the study.
- Both male and female patients were included in the study.
- COPD patient with or without comorbidities.
- Patients having COPD with age of 21-79[12].

Exclusion criteria
- Paediatric population.
- Bronchial Asthma.
- Not willing to participate in the study.

2.7. Statistical analysis
- Data were entered and analysed with the help of Microsoft Excel.
- Means were compared and using Paired sample T- test using SPSS software.
- Graphical representation is used for visual representation of the analysed data.

2.8. Ethics Approval

This study was performed in line with the principles of the Declaration of Helsinki. This is an observational study, so there is no ethical approval was required. Informed consent was obtained from all the participants involved in the study.

III. RESULTS AND DISCUSSION

The study was carried out to assess the drug use and prescribing pattern in COPD patients with or without co-morbidity. In our prospective study analysis, a total of 65 COPD were randomly selected. Out of which, 5 patients were excluded from the study on the basis of exclusion criteria, and remaining 60 patients fulfilling inclusion criteria. Hence the result was based on the data of 60 patients**.**

The demographic characteristic of the study sample of (N=60) COPD patients indicated that the male population were found to be predominantly having COPD (77%) when compared to female population which is only (23%).Among the total number of COPD patients included in the study, the number of smokers was predominantly high (63%) when compared to the non-smokers (37%).Although cigarette smoking is the most commonly encountered tobacco-related risk factor for COPD, other types of tobacco smoking popular in various countries are also risk factors for COPD and air pollution resulting from the burning of wood and other biomass fuels, has also been identified as a COPD risk factor. Passive exposure to cigarette smoke may also contribute to the development of COPD by increasing the lung total burden of inhaled particles and gases. There is now evidence that most smokers develop some respiratory impairment due to COPD. Cigarette smoke contains an extremely high concentration of oxidants. The reactive oxidant substances generated by smoking induce inflammation in the lung and its airway; cigarette smoking causes an inflammatory process in the central airways, peripheral airways, and lung parenchyma, which is present even in smokers with normal lung function. Studies have shown that in bronchial biopsies obtained from central airways, smokers have chronic inflammatory changes, with increased numbers of specific inflammatory cell types in different parts of the lung, and structural remodeling resulting from repeated injury and repair.The exact role of smoking cessation on the airway inflammation process in COPD is still unknown. In general, the inflammatory and structural changes in the airways increase with disease severity and persist despite smoking cessation.

In monotherapy, sympathomimetics and xanthene derivatives were prescribed.Bi-therapy consists of combinations such asSympathomimetics and steroids, Sympathomimetics and xanthene derivatives, Xanthene and steroids.Tri-therapy consists of combinations such asSympathomimetics, Anti-cholinergics, Xanthene derivatives and Sympathomimetics, steroids, Anti-cholinergics and Xanthene derivatives, Sympathomimetics, steroids.

At the time of inclusion, Percentage of patients having CAT score 21 - 30 receiving tri therapy was 40%,bi therapy was 30% and monotherapy was 2%, Percentage of patients having CAT score 31- 40 receiving tri therapy was 20%, bi therapy was 5%, Percentage of patients having CAT score 11-20 receiving monotherapy was 3%,

In Mono therapy, the maximum improvement in CAT Score was with Xanthene derivatives (22.5%) because $P<0.05$ and states that we have significant evidence that CAT score

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changed from admission and discharge, with an average decrease of 1.25 units with 95% confidence interval (6.15, 18.9).In Bi therapy, the maximum improvement in CAT Score was with the patient taking Xanthene derivatives and Sympathomimetics together (44.25%) because P<0.05 and states that we have significant evidence that CAT score changed from admission and discharge, with an average decrease of 1.74 units with 95% confidence interval (13.9, 20.9). In Tri therapy, the maximum improvement in CAT Score was with the patient taking Steroids, Sympathomimetics and Anti-cholinergics (37%) because P<0.05 and states that we have significant evidence that CAT score changed from admission and discharge, with an average decrease of 1.53 units with 95% confidence interval (9.6, 21.1). .

At the time of inclusion, percentage of patients having Dyspnea score of 2 receiving mono therapy was 5%, percentage of patients having Dyspnea score of 3 receiving Bi-therapy was 20%, tri-therapy was 17% and percentage of patients having Dyspnea score of 4 receiving Bi-therapy was 15% and tri-therapy was 43%

In Mono therapy, the maximum improvement in Dyspnea Score was with Xanthene derivatives (20%) because P<0.05 and states that we have significant evidence that Dyspnea score changed from admission and discharge, with an average decrease of 2.0 units with 95% confidence interval (-10.7, 14.7).In Bi therapy, the maximum improvement in Dyspnea Score was with the patient taking Steroid and Sympathomimetics (52%) together because P<0.05 and states that we have significant evidence that Dyspnea score changed from admission and discharge, with an average decrease of 2.2 units with 95% confidence interval (1.6, 2.8). In Tri therapy, the maximum improvement in Dyspnea Score was with the patient taking Steroids, Sympathomimetics and Xanthene derivatives (30%) and also shows improvement with Sympathomimetics with Xanthene derivatives and Anti-cholinergics (30%) because P<0.05 and states that we have significant evidence that Dyspnea score changed from admission and discharge.We concluded that Bi-therapy was most efficient therapy to improve clinical symptoms and quality of life of the patients. Morisky medication adherence scale was used to assess the patient's medication adherence. As a result of post-counseling medication adherence has improved

.Table 1: Distribution of COPD patients on the basis of their characteristics

VARIABLES	DISTRIBUTION OF PATIENTS WITH COPD(NO. OF PATIENTS)	PERCENTAGE OF PATIENTS WITH COPD
GENDER		
MALE	46	77%
FEMALE	14	23%
SMOKING STATUS		
SMOKER	38	63%
NON SMOKER	22	37%
DURATION OF HOSPITAL STAY (DAYS)		
8	5	8.3%
9	4	6.7%
10	7	11.7%
11	6	10%
12	2	3.3%
13	13	21.7%
14	15	25%

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15	8			13.3%	
THERAPY PRESCRIBED					
Mono therapy	3			5%	
Double therapy	21			35%	
Triple therapy	36			60%	
DRUG CLASS IN MONO-THERAPY					
Sympathomimetics	2			75%	
Xanthene Derivatives	2			25%	
DRUG CLASS IN BI-THERAPY					
SYMPTHOMIMETICS, STEROIDS	5			23.8%	
SYMPTHOMIMETIC, XANTHENE	7			33.3%	
XANTHENE, STEROIDS	9			42.9%	
DRUG CLASS IN TRI-THERAPY					
SYMPATHOMIMETICS, ANTICHOLINERGICS, XANTHENES	2			5.6%	
SYMPATHOMIMETICS, STEROIDS, ANTICHOLINERGICS	3			8.3%	
XANTHENE DERIVARIVES, SYMPATHOMIMETICS, STEROIDS	30			83.3%	
Age in years	**Male**	**Female**	**Total**	**Male (76.7%)**	**Female(23.3%)**
30-45	6	4	10	60%	40%
46-60	18	6	24	75%	25%
61-80	20	4	24	83.3%	16.7%
Above 80	2	0	2	100%	0%
COMORBID CONDITIONS					
Systemic hypertension			10		17%
Diabetes mellitus			5		8%
Acute exacerbation			39		65%
Upper respiratory infection			2		3%
Lower respiratory infection			1		2%
Cor-pulmonale			8		13%
CKD			5		8%
Pulmonary hypertension			1		2%
Respiratory failure			2		3%
Bronchiectasis			2		3%
CAD			2		3%
AF			2		3%

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Peripheral vascular disease	1	2%
Dilated cardiomyopathy	1	2%
Anemia	2	3%
Rheumatic heart disease	1	2%
PT sequale	7	12%
Old TB	3	5%
UTI	1	2%
Uremic gastritis	1	2%
Pleural effusion	1	2%
MEDICATIONS PRESCRIBED		
Sympathomimetics		
Salbutamol	33	55%
Anticholinergics		
Ipratropium bromide	4	7%
Xanthene derivatives		
Deriphylline	51	85%
Aminophylline	1	2%
Sympathomimetics/Glucocorticoids		
Formoterol + Budesonide	9	15%
Salbutamol + Budesonide	20	33%
Sympathomimetics/Anticholinergics		
Salbutamol + Ipratropium bromide	1	2%
Parenteral Glucocorticoids		
Hydrocortisone	26	43%
Dexamethasone	13	22%
Inhaled Glucocorticoids		
Budesonide	8	13%
Oral Glucocorticoids		
Prednisolone	3	5%
Methyl prednisolone	12	20%
Deflazocort	1	2%
Mucolytics		
N-Acetylcystine	4	7%
Antibiotics		
Ceftriaxone	29	48%
Cefotaxim	23	38%
Amoxicillin	6	10%
Ampicillin	6	10%
Azithromycin	14	23%
Ciprofloxacin	3	5%
Cephalexin	1	2%

Table 2Distribution of patients on the basis of their CAT score in Percentage (at the time of inclusion)

Therapy	**PERCENTAGE OF PATIENTS (%)**			
	CAT SCORE			
	0-10	**11-20**	**21-30**	**31-40**
Mono	0	3%	2%	0
Bi	0	0	30%	5%
Tri	0	0	40%	20%

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Table 3 Improvement in CAT Score with Mono Therapy

Therapy	Medication	CAT Score (at the time of Inclusion)	CAT Score (at the time ofDischarge)	Paired sample differences	P – value	% Improvement at the time of Discharge
MONO	Sympathomimetics	17.5 ± 0.5	9.5 ± 1.5	8.0±2.0	0.156	**20%**
	Xanthene Derivatives	23 ± 1	10.5 ± 1.5	1.25± 0.5	0.025	**22.5%**

Results were expressed as Mean ± SEM ; T- value for sympatomimetics and xanthenes were 4.0 and 25.0 respectively.

Table 4 Improvement in CAT Score with Bi Therapy

Therapy	Medication	CAT Score (at the time of Inclusion)	CAT Score (at the time of Discharge)	Paired sample differences	P- value	% Improvement at the time of Discharge
BI	Sympathomimeticsxanthenes	27.7 ± 1.4	10.2 ± 0.6	1.74± 1.4	0.000	44.25%
	Sympathomimetics, Steroids	26.0 ± 1.5	9.8 ± 0.58	1.62 ± 1.6	0.001	41.5%
	Xanthenes, Steroids	28.2 ± 1.1	10.4 ± 0.6	1.77 ±1.2	0.000	43.7%

Results were expressed as Mean ± SEM; T – value for Sympathomimetics + Xanthene Derivatives,Sympathomimetics + Steroids and Xanthene Derivatives +Steroids were 12.3, 9.9 and 14.4 respectively.

Table 5 Improvement in CAT Score with Tri Therapy

Therapy	Medication	CAT Score (at the time of Inclusion)	CAT Score (at the time of Discharge)	Paired sample differences	P – value	% Improvement at the time of Discharge
TRI	Steroids, Sympathomimetics, Anticholinergics.	31.3 ± 0.66	16 ± 1.15	1.53±1.3	0.007	37.5%
	Xanthenes, Sympathomimetics, Steroids.	29.2 ± 0.56	16.5 ± 0.82	1.27±0.92	0.000	31.5%

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	Sympathomimetics, Anticholinergics. Xanthenes,	24.5 ± 1.5	19.0 ± 2.0	5.50±3.5	0.361	22.5%

Results were expressed as Mean ± SEM ; T – value for Steroids + Sympathomimetics +Anticholinergics, Xanthene Derivatives +Sympathomimetics + Steroids and Sympathomimetics +Anticholinergics+ Xanthene Derivatives were 11.5, 13.6 and 1.6 respectively.

Table 6 Distribution of patients on the basis of their dyspnea score in percentage (at the time of inclusion)

THERAPY	PERCENTAGE OF PATIENTS (%)				
	0	**1**	**2**	**3**	**4**
Mono	0	0	5%	0	0
Bi	0	0	0	20%	15%
Tri	0	0	0	17%	43%

Table 7 Improvement in MMRC Grade with Mono Therapy

Therapy	Medication	MMRC grade (at the time of Inclusion)	MMRC grade (at the time of Discharge)	Paired sample differences	P - value	% Improvement at the time of Discharge
MONO	Sympathomimetics	2.0 ± 0.00	1.5 ± .50	0.50±0.5	0.500	10%
	Xanthenes	3.5 ± 0.5	1.5 ± 0.5	2.00±1.0	0.295	20%

Results were expressed as Mean ± SEM; T- value for sympatomimetics and xanthenes were 1.0 and 2.0 respectively.

Table 8 Improvement in MMRC Grade with Bi Therapy

Therapy	Medication	MMRC Grade (at the time of Inclusion)	MMRC Grade (at the time of Discharge)	Paired sample differences	P – value	% Improvement at the time of Discharge
BI	Sympathomimetics, Xanthenes	3.85 ± 0.14	1.42 ± 0.20	2.42±0.2	0.000	46.2%
	Sympathomimetics, Steroids	3.6 ± 0.24	1.4 ± 0.24	2.20±0.2	0.000	52%
	Xanthene Derivatives, Steroids	3.88 ± 0.11	1.44 ± 0.17	2.44±0.2	0.000	46%

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Results were expressed as Mean ± SEM ; T – value for Sympathomimetics + Xanthene Derivatives,Sympathomimetics + Steroids and Xanthene Derivatives +Steroids were 12.0, 11.0 and 13.9 respectively.

Table 9 Improvement in MMRC Grade with Tri Therapy

Therapy	Medication	MMRC Grade (at the time of Inclusion)	MMRC Grade (at the time of Discharge)	Paired sample differences	P – value	% Improvement at time of Discharge
TRI	Steroids, Sympathomimetics, Anticholinergics.	4.0 ± 0.00	1.66 ± 0.33	2.33±0.3	0.020	26%
	Xanthenes, Steroids, Sympathomimetics,	3.93 ± 0.046	2.40 ± 0.09	1.53±0.1	0.000	30%
	Sympathomimetics, Anticholinergics, Xanthenes	4.0 ± 0.00	2.50 ± 0.50	1.50±0.5	0.205	30%

Results were expressed as Mean ± SEM ; T – value for Steroids + Sympathomimetics +Anticholinergics, Xanthene Derivatives +Sympathomimetics + Steroids and Sympathomimetics +Anticholinergics+ Xanthene Derivatives were 7.0, 16.6 and 3.0 respectively.

Table 10Assessment of medication adherence by using Morisky Adherence Scale

SCORE	PRE - COUNSELLING		POST COUNSELLING	
	No. of patients	% of patients	No. of patients	% of patients
LOW (3-8)	20	33.3%	7	11.7%
MEDIUM (1-2)	28	46.7%	20	33.3%
HIGH (0)	13	21.7%	33	55%

IV. CONCLUSION

Irregular screening, poor adherence to therapy and uncontrolled smoking is associated with serious outcomes progressing to complications, worsening of disease. This increases rate of hospitalizations and mortality. From the study, we conclude that smokers have higher exposure to get COPD. Xanthene derivatives were predominant in prescriptions; dominating the therapy. Salbutamol remains the first line drug of choice. Formoterol and budesonide were used only in severe cases and was found to be more effective in achieving target in hospitalized patients. The maximum improvement in the symptoms of disease (CAT Score) was found with Bi therapy (Xanthene derivatives and Sympathomimetics) also, the severity of disease (Dyspnea Score) was found to be improved with Bi therapy (Steroids and Sympathomimetics). Complications make the therapeutic regimen more challenging. Patients lack of awareness on severity of disease and hence were not concern about drug usage. Patient education on management of disease and importance of adherence to therapy will have potential benefits in improving patient's quality of life. Rational use of drugs as monotherapy or in combination when necessary will minimize the dosage of drugs and thereby eliminating avoidable adverse effects.

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AUTHOR'S CONTRIBUTION
Mr.A.Melwinraj: concept and design, data acquisition, manuscript preparation and manuscript editing. Ms.M.Narmatha: manuscript preparation and data acquisition. Ms.B.Naveena: critical revision of manuscript, literature search and statistical analysis. and Dr.M.Mohankumar: literature search, technical support and supervision. Dr.P.Thirupathi Kumaresan: supervision and final approval.

REFERENCES

[1]. Barnes PJ. Chronic obstructive pulmonary disease. N Engl J Med. 2000 Jul 27;343(4):269-80. doi: 10.1056/NEJM200007273430407. PMID: 10911010

[2]. American Thoracic Society. Standards for the diagnosis and care of patients with chronic obstructive pulmonary disease. Am J RespirCrit Care Med. 1995;152:77S-120S.

[3]. Pauwels RA, Buist AS, Calverley PM, Jenkins CR, Hurd SS; GOLD Scientific Committee. Global strategy for the diagnosis, management, and prevention of chronic obstructive pulmonary disease. NHLBI/WHO Global Initiative for Chronic Obstructive Lung Disease (GOLD) Workshop summary. Am J Respir Crit Care Med. 2001 Apr;163(5):1256-76. doi: 10.1164/ajrccm.163.5.2101039. PMID: 11316667.

[4]. Mohan H. Textbook of PathologyHarsh Mohan .7th ed.New Delhi: Jaypee Brothers; 2000

[5]. Mohan H. Textbook of Pathology Harsh Mohan . 7th ed. New Delhi: Jaypee Brothers; 2000.

[6]. National Institute for Clinical Excellence. Chronic obstructive pulmonary disease: Management of chronic obstructive pulmonary disease in adults in primary and secondary care. 2008.

[7]. Tager IB, Segal MR, Speizer FE, Weiss ST. The natural history of forced expiratory volumes. Am Rev Respir Dis. 1988;138:837-49.

[8]. Miravitlles M, Vogelmeier C, Roche N, Halpin D, Cardoso J, Chuchalin AG, et al. A review of national guidelines for management of COPD in Europe.European Respiratory Journal. 2016 Feb 1;47(2):625-37.

[9]. Dong YH, Hsu CL, Li YY, Chang CH, Lai MS. Bronchodilators use in patients with COPD. International Journal of Chronic Obstructive Pulmonary Disease. 2015;10:1769.

[10]. Montuschi P. Pharmacological treatment of chronic obstructive pulmonary disease.International journal of chronic obstructive pulmonary disease. 2006 Dec;1(4):409.

[11]. Pisi R, Aiello M, Calzetta L, Frizzelli A, Tzani P, Bertorelli G, et al. The COPD assessment test and the modified Medical Research Council scale are not equivalent when related to the maximal exercise capacity in COPD patients. Pulmonology. 2023 May 1;29(3):194-9.

[12]. Wu YK, Su WL, Yang MC, Chen SY, Wu CW, Lan CC. associations between physical activity, smoking status, and airflow obstruction and self-reported COPD: a population-based study. International Journal of Chronic Obstructive Pulmonary Disease. 2022 May 20:1195-204.

[13]. Global Initiative for Chronic Obstructive Lung Disease (GOLD). Global Strategy for the Diagnosis, Management and Prevention of COPD. 2008.

[14]. Jindal SK, Aggarwal AN, Chaudhry K, Chhabra SK, D'Souza GA, Gupta D, et al. A multicentric study on epidemiology of chronic obstructive pulmonary disease and its relationship with tobacco smoking and environmental tobacco smoke exposure. The Indian journal of chest diseases & allied sciences. 2006 Jan 1;48(1):23-9

[15]. Al-Fayez SF, Salleh M, Ardawi M, Zahran FM. Effects of sheesha and cigarette smoking on pulmonary function of Saudi males and females. Tropical and

geographical medicine. 1988 Apr 1;40(2):115-23.

[16]. Eisner MD, Balmes J, Katz PP, Trupin L, Yelin EH, Blanc PD. Lifetime environmental tobacco smoke exposure and the risk of chronic obstructive pulmonary disease. Environmental Health. 2005 Dec;4:1-8.

[17]. Marsh S, Aldington S, Shirtcliffe P, Weatherall M, Beasley R. Smoking and COPD: what really are the risks?.European Respiratory Journal. 2006 Oct 1;28(4):883-4.

[18]. Rennard SI, Vestbo J. COPD: the dangerous underestimate of 15%. The Lancet. 2006 Apr 15;367(9518):1216-9.

[19]. Brody JS, Spira A. State of the art. Chronic obstructive pulmonary disease, inflammation, and lung cancer.Proceedings of the American Thoracic Society. 2006 Aug;3(6):535-7.

[20]. Saetta M. Airway inflammation in chronic obstructive pulmonary disease. American journal of respiratory and critical care medicine. 1999 Nov 1;160(supplement_1):S17-20.

[21]. Saetta M, Di Stefano A, Maestrelli P, Ferraresso A, Drigo R, Potena A, et al. Activated T-lymphocytes and macrophages in bronchial mucosa of subjects with chronic bronchitis.American review of respiratory disease. 1993 Feb 1;147:301-.

[22]. Rutgers SR, Postma DS, ten Hacken NH, Kauffman HF, van der Mark TW, Koëter GH, et al. Ongoing airway inflammation in patients with COPD who do not currently smoke. Thorax. 2000 Jan 1;55(1):12-8.

[23]. Willemse BW, ten Hacken NH, Rutgers B, Lesman-Leegte IG, Postma DS, Timens W. Effect of 1-year smoking cessation on airway inflammation in COPD and asymptomatic smokers. European Respiratory Journal. 2005 Nov 1;26(5):835-45.

[24]. Teli A. A study of drug utilization and prescribing patterns of drugs in chronic obstructive pulmonary diseased patients (IPD and OPD) in tertiary care hospital. Acta Scientific Pharmacology. 2020;1:01-9..