Co Morbidities in Chronic Obstructive Pulmonary Disease, Are We Aware

Anita Velingker[1], Durga Lawande[2]

ABSTRACT

Introduction: COPD is a major cause of morbidity and mortality worldwide Besides lungs it has systemic effects, co morbidities. These co morbidities increase the risk of exacerbation, reduce health status and increase risk of mortality. The primary objective of this study was to asses the various co morbidities in COPD patients, to study the difference in proportion of co morbidities in smokers as compared to the non-smokers and to study the proportion of various co morbidities according to GOLD stage

Material and methods: We studied 55 consecutive COPD patients who presented to the department of pulmonary medicine, Goa Medical College from August 2016 to July 2017.

Results: Out of the 55 patients included in the study 34 (61.8%) were males and 21(31.8%) were females, age (mean and SD) 67.32±9.46, FEV1% (mean and SD) 47.45±12.78, FEV1/FVC% (mean and SD) 57.05±9.11, 36(65.4%) were smokers with pack /year (mean and SD) 26.08±17.55, and 19(34.5%) had biomass exposure with Biomass exposure index (mean and SD)104.54±71.05 and Hb (mean and SD) was 12.83±2.19. The most frequent co morbidties were hypertension 54.5% (30 cases), followed by psychological disturbance like depression 43.6% (24 cases). Percentage of co morbidities were higher in the COPD patients exposed to tobacco smoke as compared to biomass smoke. Percentage of co morbidities were higher in the very severe stage of COPD as compared to the other stages of COPD.

Conclusion: We recommend as a general practice to asses co morbidities in all COPD patients and vise versa as the co morbidities play a important role in exacerbation, reducing health status and increasing risk of mortality

Keywords: Chronic Obstructive Lung Diseases, Co Morbidities, Smoking

INTRODUCTION

COPD is a major cause of morbidity and mortality worldwide It has been projected to be the 3rd most common cause of death and 3rd in terms of morbidity worldwide by 2020.[1,2,3]

COPD is known primarily to affect the lung structure and function resulting in emphysematous destruction of lung tissue and large and small airways disease that occur in varying proportion and severity within individuals.[1,4]

The primary cause of COPD is inhalation of noxious particles and gases in the form of commonly tobacco smoke and less commonly due to inhalation of biomass fuel smoke which is generated by burning of firewood, cowdung etc (non smoking COPD) This practice is still observed in the rural parts of our country.

Besides the lung abnormalities, COPD has impact on other organs, so called systemic effects or co morbidities.[1,5,6,7] Co morbidities has been defined as a disease co existing with the primary disease of interest.

Co morbidities play a important role by increasing risk for exacerbation, reducing health status and increasing risk of mortality.[8,9,10] Various studies have shown that hypertension, heart failure, ischemic heart disease, anaemia, osteoporosis, anxiety, depression, cachexia are more frequently noticed in COPD patients than in the general population.[2,11,12,13,14]

Systemic inflammation is the key link between COPD and related co morbidities. The origin of systemic inflammation have different postulates, some believe it to be spill over of inflammatory mediators from chronic bronchial and pulmonary inflammation in COPD.[15,16,17] Alternatively COPD has been interpreted to be one part of chronic systemic inflammatory syndrome among other inflammatory entities, encompassing particular local manifestation of one super ordinate trigger.[15,18,19]

The diagnosis and management of COPD and its co morbidities are from an individual disease rather than multimodality approach Knowledge of multimodality in COPD patients would help to evaluate a different approach.[8,20]

Research on prevalence of co morbidities in COPD is rare Increasing knowledge is required for good intervention strategies and reframing clinical guidelines.

This study was undertaken to evaluate various co morbidities associated among the cases of COPD, to study the difference in proportion of co morbidities in smokers as compared to non smoker and to see the proportion of various co morbidities according to the GOLD stage, amongst the COPD cases presenting to the department of pulmonary medicine, Goa Medical College

MATERIAL AND METHODS

Retrospective observational study was conducted in the department of pulmonary medicine, Goa Medical College, a tertiary care hospital. The population included all the patients who were Pulmonary Function Test proven cases of COPD who attended out patient as well as in patient department of

[1]Assistant Professor, [2]Head of Department, Department of Pulmonary Medicine, Goa Medical College, Goa, India

Corresponding author: Dr Anita Velingker, Nandanban Complex B-1, Second floor, St Inez, Panaji, Goa, PO Caranzalem 403002

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pulmonary medicine, Goa Medical College during the study period. Data for this study has been obtained from hospital records for a period of 1 years from August 2017 to July 2018.

Source of information

For this study, data was obtained from hospital records of the department of pulmonary medicine, Goa Medical College

Inclusion criteria

All PFT proven cases of COPD as per GOLD 2017.

Exclusion criteria

COPD with other respiratory illnesses like TB, Asthma.

Method

The study includes all the patients who were PFT proven cases of COPD who attended out patient as well as in patient department of Pulmonary Medicine, Goa Medical College from August 2017 to July 2018.

COPD diagnosis were confirmed by spirometry performed on Jaeger spirometer according to Global initiative for chronic Obstuctive Lung Diseases (GOLD 2017) criteria (FEV1/FVC <70% after 4 puffs of bronchodilator)The test was performed in respect of ATS/ERS guidelines.[2,21,22]

Presenting symptoms of cough, sputum, dyspnea according to Modified Medical Research Council scale (mMRC scale), smoking history and co morbidities were evaluated. In smokers, pack year were calculated and in patients who were non smokers who were exposed to biomass, biomass exposure index was calculated.

No of pack years = No of packs smoked per day × No of years
= No of ciggrattes per day/20 × No of years

Biomass exposure index = Average hours spent cooking/day × No of years

Detailed history pertaining to co morbidities, clinical examination with respect to presence or absence of pallor, pedal edema, features of skeletal muscle dysfunction, peripheral vascular disease, blood pressure, JVP was also noted.

Blood pressure was interpreted as per new ACC/AHA guidelines 2017 as normal <120/80, elevated systolic between 120-129 and diastolic <80, stage 1 systolic between 130-139 or diastolic between 80-89, stage 2 systolic at least 140 or diastolic at least 90 and hypertensive crises –systolic over 180 and/or diastolic over 120 (American College of Cardiology nov 2017).

Significant findings in other systems like cardiovascular, central nervous system and gastrointestinal system were also noted.

Body Mass Index (BMI) was measured to assess for cachexia

$$\text{Body Mass Index} = \frac{\text{weight in kg}}{(\text{Height in metre})^2}$$

Cachexia has been defined as loss of lean tissue mass involving a weight loss greater than 5% of body weight in 12 months or less in the presence of chronic illness or as BMI<20kg/m^2. In addition, usually 3 of the 5 criteria are required, decreased muscle strength, fatigue, anorexia, low fat free mass index, increase in inflammatory markers as well as anaemia or low serum albumin (society of sarcopenia, cachexia and wasting disorder).[23] Records of ophthalmological examination to asses for cataract was noted.

The blood investigations consisted of Haemoglobin, total counts, differential counts, serum creatinine, fasting blood sugar, post prandial blood sugar, HBA1C We considered anaemia when Hb <12g/dl and renal failure when creatinine >1.2mg/dl.

Normal Hb range is generally defined as 13.5-17.5 of Hb per decilitre of blood for men and 12 to 15.5 for women (www.mayoclinic.org).

The normal range of creatinine in blood was considered to be .8 -1.2 (mayoclinic).

Other specialised investigations like Chest Xray, ECG, Cardiac Echo Doppler were noted. Presence or absence of lung ca was recorded depending on the findings of CT thorax, FNAC, biopsy, bronchoscopy.

STATISTICAL ANALYSIS

Statistical analysis for association was performed by SPSS software 2017. Chi square or fisher test was performed for association p valve <.05 was considered statistically significant.

Age (mean and SD)	67.32±9.76
Gender	M 34(61.8%) F 21(31.8%)
FEV1% (mean and SD)	47.45±12.78
FEV1/FVC% (mean and SD)	57.05±9.11
Smokers	36(65.4%)
Pack year (mean and SD)	26.08±17.55
Biomass exposure	19(34.5%)
Biomass exposure index (mean and SD)	104.54±71.05
Hb (mean and SD)	12.83±2.19
Abnormal renal parameters	8(14.5%)

Table-1: Characteristics of study population (COPD patients)

Co morbidities	Number	Percentage
Hypertension	30	54.5
Psychological disturbance	24	43.6
Pulmonary hypertension	22	40
Anaemia	20	36.3
Gatro oesophageal reflux disease	20	36.3
Sleep disturbance	20	36.3
Ischaemic Heart disease	17	30.9
Osteoporosis	15	27.2
Diabetes mellitus	15	27.2
Cataract	14	25.4
Cachexia	14	25.4
Lung cancer	8	14.5
Chronic Kidney Disease	8	14.5
Pneumonia	6	10.9
Arthritis	6	10.9
Atrial fibrillation	5	9.09
Stroke	4	7.2
Peripheral Vascular diseases	4	7.2
Obesity sleep apnea	2	3.6

Table-2: Percentage of co morbidities in COPD patients

Co morbidites	Tobacco smoke		Biomass smoke		Total
	No	%	No	%	
Hypertension	18	60	12	40	30
Psychological disturbance	14	58.33	10	41.66	24
Pulmonary hypertension	12	54.54	10	45.45	22
Anaemia	12	60	8	40	20
Gatro oesophageal reflux disease	14	70	6	30	20
Sleep disturbance	12	60	8	40	20
Ischaemic Heart disease	10	58.82	7	41.17	17
Osteoporosis	10	66.66	5	33.33	15
Diabetes mellitus	9	60	6	40	15
Cachexia	8	57.14	6	42.84	14
Cataract	8	57.14	6	42.84	14
Lung cancer	6	75	2	25	8
Chronic Kidney Disease	6	75	2	25	8
Pneumonia	4	66.66	2	33.33	6
Arthritis	4	66.66	2	33.33	6
Atrial fibrillation	4	80	1	20	5
Stroke	3	75	1	25	4
Peripheral Vascular diseases	3	75	1	25	4
Obesity sleep apnea	2	100	0	0	2

Table-3: Percentage of comorbidities in COPD caused by tobacco smoke and biomass smoke

Comorbidities	GOLD stage								
	Mild		Moderate		Severe		Very severe		Total
	No	%	No	%	No	%	No	%	
Hypertension	6	20	6	20	8	26.6	10	33.3	30
Psychological disturbance	1	4.1	2	8.3	8	33.3	14	58.3	24
Pulmonary hypertension	1	4.54	2	9.09	8	36.3	11	50	22
Anaemia	1	5	1	5	7	35	11	55	20
Gatro oesophageal reflux disease	0	0	1	5	8	40	11	55	20
Sleep disturbance	1	5	1	5	6	30	12	60	20
Ischaemic Heart disease	1	5.9	2	11.7	5	29.4	9	52.9	17
Osteoporosis	0	0	1	6.6	4	26.6	10	66.6	15
Diabetes mellitus	0	0	3	20	3	20	9	60	15
Cachexia	0	0	2	14.2	4	28.5	8	57.1	14
Cataract	0	0	0	0	3	21.42	11	78.5	14
Lung cancer	1	12.5	1	12.5	2	25	4	50	8
Chronic Kidney Disease	0	0	1	12.5	1	12.5	6	75	8
Pneumonia	0	0	0	0	2	33.3	4	66.6	6
Arthritis	0	0	0	0	2	33.3	4	66.6	6
Atrial fibrillation	0	0	0	0	2	40	3	60	5
Stroke	0	0	0	0	2	50	2	50	4
Peripheral Vascular diseases	0	0	0	0	2	50	2	50	4
Obesity sleep apnea	0	0	0	0	1	50	1	50	2

Table-4: GOLD stage and Co morbidities

RESULTS

The most frequent co morbidties were hypertension 54.5% (30 cases), followed by psychological disturbance like depression 43.6% (24 cases), pulmonary hypertension 40% (22 cases), anaemia 36.3% (20 cases), gatro oesophageal reflux disease 36.3% (20 cases), while the others were less frequent as seen in the table 1, 2.

It was seen that the percentage of all the comorbidities were higher in the COPD patients exposed to tobacco smoke as compared to the biomass smoke (table-3).

Table-4 represents the number of co morbidities according to the GOLD stage and shows that percentage of various co morbidities were higher in the very severe followed by severe stage of COPD as compared to the moderate or mild GOLD stage of COPD.

DISCUSSION

COPD is a progressive disease with partially reversible airway obstruction It is a pathological inflammatory response of the lungs to noxious environmental particles.

The associated systemic inflammation is responsible for the extrapulmonary morbidities Chronic inflammation in the respiratory tract to the noxious particles and gases and the

oxidative stress play a important role Oxidants released from the inflammatory cells in the lung and systemic circulation play a big role in occurrence of co morbidities.

The co morbidities increase the frequency of exacerbation, progression of diseases, increase morbidity and also increases the cost of management.

In our study the most frequent co morbidties were hypertension 54.5% (30 cases), followed by psychological disturbance like depression 43.6% (24 cases), pulmonary hypertension 40% (22 cases), anaemia 36.3% (20 cases), gatro oesophageal reflux disease 36.3% (20 cases), while the others were less frequent like sleep disturbance 36.36% (20 cases), ischemic heart disease 30.9% (17 cases), osteoporosis 27.2% (15 cases), diabetes mellitus 27.27% (15 cases), cataract 25.4% (14 cases), cachexia 25.2% (14 cases), lung cancer 14.5% (8 cases), chronic kidney diseases 14.5% (8cases), pneumonia 10.9% (6 cases), arthritis 10.9% (6 cases), atrial fibrillation 9.09% (5 cases), stroke 7.2% (4 cases), peripheral vascular disease 7.27% (4 cases) and sleep apnea 3.6%(2 cases).

In a study from Syria, Yousser Mohammad et al in 99 COPD patients 61.62% had hypertension, 25.25% had diabetes, 37.37% had ischemic heart disease, 13.1% had atrial fibrillation, 44% had anaemia, 47.47% had pulmonary hypertension, 20% had cancer, 25% had osteoporosis which is almost similar to our study.[2]

Similarly in a multicentric study from Spain, Almagro et al in 398 patients, 61% had hypertension, 27% had diabetes, 27% had heart failure, 33% had anaemia.[12]

In our study it was also seen that the percentage of all the co morbidities were higher in the COPD patients exposed to tobacco smoke as compared to the biomass smoke which is similar to another study conducted in Spain, Rafeal Gople et al in 863 patients.[24]

There are two possible explanations for this observation Firstly, the different nature of noxious agents in biomass and tobacco smoke may cause the difference specially the direct effect on coronary vessels Secondly difference in the systemic inflammatory response to biomass and tobacco smoke.[24,25]

In our study it was also seen that percentage of various co morbidities were higher in the very severe followed by severe stage of COPD as compared to the moderate or mild GOLD stage of COPD which is similar to the study from Syria, Yousser Mohammad et al in 99 COPD patients.[2]

To summarise, early diagnosis of COPD should be our ultimate goal to improve COPD care and prevent co morbidities.[2,11]

It is important to assess co morbidities in COPD patients as treating co morbidities can improve life expectancy.[2,11]

Limitations of the study

In our study, the assessment of osteoporosis (co morbidity) was done by digital hand xray as bone mineral density equipment is not available in our set up Hence the accuracy of osteoporosis may not be that accurate as compared to bone mineral density equipment.

Secondly, it is a hospital based study hence cannot be generalised to the community at large, but it gives us a valuable information about COPD and the prevalence of various co morbidities in people exposed to tobacco and biomass smoke.

CONCLUSION

COPD is a systemic disease causing co morbidities Hence it is important to make a early diagnosis of COPD to improve COPD care and prevent co morbidities Screening all COPD patients for cardiac diseases, osteoporosis, and other comorbidities and integrated management should be a part of our daily practice.

It is necessary to focus on COPD co morbidities and move from the traditional assessment of COPD such as well accepted FEV1 based GOLD staging system to newer classification system that recommends a combined COPD assessment which includes symptoms, airflow obstruction, rate of exacerbation, and co morbidities.

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