Assessment of risk factors for readmission in COPD patients at tertiary care centre RMCH Bareilly

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Abstract---COPD is currently one of the top 3 causes of death in the world with high morbidity and mortality. Various studies showed if symptoms of COPD patients are not well controlled then chances of admission & readmission has been increased. To find reasons for readmission in such patients this study was conducted. Between January 2020 and December 2021, we prospectively evaluated all the patients who were readmitted for acute exacerbation of COPD at tertiary care hospital RMCH Bareilly. Total 119 patients were enrolled in our study. Among 119 patients 25(21.0%) patients were readmitted for acute exacerbation of COPD. Patients discharged on LTOT among them 16(64.0%) were readmitted. Sputum culture among readmitted patients showed pseudomonal growth in 10(40.0%) as important risk factor. Common Comorbidities observed as diabetes mellitus 8(32.0%), hypertension 6(24%) of readmitted patients. Duration of hospital stay on previous visit of more than 6 days was observed in 12(48.0%) of readmitted patients. Average duration of hospital stays was 7+/-3 days. We found that there are multiple factors contribute to the risk of readmission in COPD patients. Risks can be minimised by ensuring regular follow up and proper adherence to the treatment, proper nutrition and pulmonary rehabilitation.

Keywords---chronic obstructive pulmonary disease, long term oxygen therapy, readmission, pulmonary rehabilitation.

Introduction

COPD is currently one of the top 3 causes of death in the world with high morbidity and mortality. COPD is a common and preventable disease in which there is regularity of symptoms causing significant limitation of airflow due to constant exposure to noxious particles and gases. Hospitalization for acute exacerbation usually occurs in the advance stages of chronic obstructive pulmonary disease. Up to 20% of patients with chronic obstructive pulmonary disease (COPD) require re-admission within 30 days of discharge after hospitalization for acute exacerbations of the disease. These re-admissions can increase morbidity and also account for increased economic burden on patient's pocket. In our study we evaluated the risk factors for readmissions in COPD patients.

Material & Methods

This study was carried out prospectively to evaluate all the patients who were readmitted for acute exacerbation of COPD at tertiary care hospital RMCH, Bareilly during period of two years from January 2020 and December 2021.

Methods

All cases were thoroughly subjected to the following protocols:

- Detailed medical history and through clinical examination.
- Chest x-ray was done
- All necessary investigations including (ABG, ECG, Sputum analysis, CBC, LFT, and KFT) and other investigations were considered as per requirement.

Inclusion criteria

All patients with clinical diagnosis of COPD confirmed by spirometry showing FEV 1/FVC ratio < 70% of their reference value post bronchodilation on previous visit.

Exclusion criteria

- Hospitalization for causes other than COPD exacerbation
- Patient not giving consent for participation in the study

Results

Between January 2020 till December 2021, total 119 patients were enrolled in our study. Out of 119 patients 25(21.0%) patients were readmitted for acute exacerbation of COPD. Out of 25 readmitted patients the gender distribution were 21(84.0%) male and 4 (16.0%) were females. Current smokers among readmitted patients (mostly Bidi preparation) was present in 5 (20.0%), Ex-smokers were 18(72.0%) and non-smokers were 2(8.0%) among readmitted patients. Exposure to biomass fuel is present in 10 (40.0%) of the patients and majority of them were women. 16(64.0%) patients were readmitted among those who were discharged on LTOT. Readmission rate was found to be 14(56.0%) among those who received

vaccination in the form of pneumococcal and influenza. Among readmitted patients 10(40.0%) showed pseudomonal growth on sputum culture, 6(24.0%) showed streptococcus aures and 1(4.0%) showed kleibsella pneumonia growth. Common comorbidities among readmitted patients were diabetes mellitus 8(32.0%), hypertension in 6(24%) , CAD in 3(12.0%), obesity in 3(12.0%), renal failure in 3(12.0%) and cor-pulmonale in 3(12.0%) patients Among 25 readmitted patients 12(48.0%) had history of previous hospital stay of more than 6 days, 8(32.0%) had 4-6 days and 5(20.0%) patients had hospital stay of less than 3 days. Average duration of hospital stay was 7+/-3 days.

Results

Table 1
Socio-demographic determinants of readmitted patients

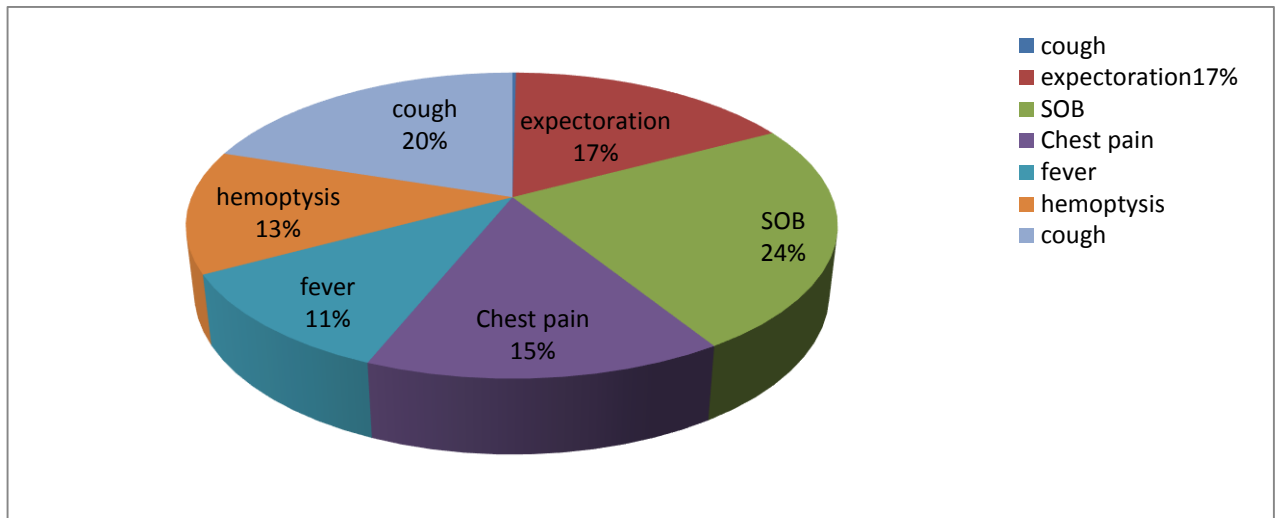|		Frequency	Chi square	P value
Gender	Male	(21)84.0%	0.36	0.54
	Female	(4)16.0%		
Biomass exposure		(10)40.0%	3.06	0.08
Smoking	Smoker	(5)20.0%	1.81	0.61
	Non smoker	(2)8.0%		
	Ex-smoker	(18)72.0%		

Figure 1. Symptom profile of readmitted patients

Table 2
Multiple variables determining risk of readmission in COPD patients

		Frequency	Chi square value	P value
Duration of hospital stay	<3 days	(5)20.0%	73.90	0.00*
	4-6 days	(8)32.0%		
	>6 days	(12)48.0%		
LTOT		(16)64.0%	25.25	0.00*
Sputum culture	Klebsiella	(1)4.0%	0.07	0.78
	Pseudomonas	(10)40.0%	24.30	0.00*
	Streptococcus	(6)24.0%	0.63	0.42
Vaccination		(14)56.0%	1.05	0.30
Comorbidities	DM	(8)32.0%	19.53	0.00*
	CAD	(3)12.0%	2.13	0.14
	HTN	(6)24.0%	8.21	0.00*
	Obesity	(3)12.0%	0.00	0.96
	Renal failure	(3)12.0%	2.13	0.14
	Cor Pulmonale	(3)12.0%	0.53	0.46

*Statistically significant values.

Discussion

In our study we found that the readmission rate in COPD patients is 25(21.0%). The similar results of readmission rate between 18-21% were reported by Jacobes DM et al (2018), Candrilli SD et al (2015), Guerrero M et al (2016) and Zhong X et al (2017) . While lower rates of readmission (9.5%) was observed by Choi J et al (2018) and higher rate of readmission was reported by Bottle A et al (39%) 2018 and Chawla H et al 2014(26%). The mean age of the patients in our study who were readmitted was 63.58+/-5 years among males and 58.63+/-4 years in females. Similar observations were found by Burgel PR et al (2006), while higher mean age group between 70-80+/-9.5 years was observed by Coventry PA et al 2011, ChoI J et al(2018), Chawla H et al 2014and Guerrero M et al (2016). On contrary Rycroft CE et al (2012) observed mean age of 40-60 years for readmission in COPD patients. In our study we observed that male gender is having predominantly higher readmission rate of 21(84.0%). Almost similar observations were noted by Guerrero M et al 2016 (84.5%) males [2]. Tae wan Kim et al 2021observed male sex having highest readmission rate, Barba R et al 2012 and Mcghan R et al 2007 observed similar findings while Fuhrman C et al 2017 observed female predominance for readmission in COPD patients.

As per universal observation majority of the COPD patients who were readmitted have smoking habit. In our study also we observed that the patients who have history of smoking have greater risk of readmission. Similar observation were noted by Garica Aymarich J et al (2003) and Godtfresdin NS et al 2002. Another important observation in our study that increased duration of hospital stay is significantly associated with higher readmission rate .The patients who were previously hospitalized for more than 6 days has higher rate of readmission and was statistically significant with p value of 0.001.The reason might be because of the severity of the disease or the presence of underlying comorbidities or due to

secondary infection. Similar observation was made by Garcia Aymerich j et al (2001, 2003) who observed patients staying for 8–10 days had increased risk of readmission by 64%. Rinne ST et al (2017) found that those patients with duration of hospital stay of 3–4 days had higher risk of readmission while Simmering je et al (2017) found that patients who stayed for >1 day had higher rate of readmission.

In our study we observed two comorbidities hypertension and diabetes were frequently associated with higher risk of readmission with statistically significant p value of 0.001. Hypertension as a major comorbidity with a greater risk for readmission in COPD patients (62%) was also observed by Simmering je et al 2016. While as Enomoto LM et al 2017 observed Diabetes as one of the common comorbidity with higher risk for readmission in COPD patients. While other comorbidities like CAD, obesity and renal failure were also found to be associated with risk of readmission but were not statically significant. Another important risk factor for readmission observed in our study was that those patients who were previously discharged on LTOT (long term oxygen therapy) had higher risk of readmission with statically significant p value of 0.001.Similar observations were also noted by Chaouat A et al 1999, Garcia Aymerich 2001 et al and Wang F et al 2005. In our study we found that patients who had secondary infection of pseudomonas on previous hospitalization had higher risk of readmission rate .Similar observations were found by Lee Ys et al and Rodrigo-Troyano A et al 2018.

Conclusion

With regard to outcome of our study we concluded that there are multiple factors which contribute to the risk of readmission in COPD patients. Risk of readmission can be minimised by ensuring regular follow up and proper adherence to the treatment. Correct technique of inhaler use, ensuring good nutritional status, vaccination and pulmonary rehabilitation has to be promoted to minimise the readmission in COPD patients.

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