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ORIGINAL ARTICLE

To assess the acute exacerbations of chronic obstructive pulmonary disease (COPD) patients

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ABSTRACT:
Aim: The purpose of this study is to assess the acute symptoms of chronic obstructive pulmonary disease (COPD). **Methods:** This research included all participants who had been hospitalised for COPD exacerbations. In this research, we classified COPD exacerbations as patients hospitalised with a main diagnosis of COPD or those admitted with a primary diagnosis of pneumonia and a secondary diagnosis of COPD. In-hospital mortality and one-year mortality following discharge were the outcomes of interest. Demographics, comorbid conditions, concomitant drugs, and COPD treatments are all discussed. COPD-related drugs, including as short- and long-acting b2 agonists, anticholinergics, inhaled corticosteroids, and theophyllines, were assessed in the six months before the first hospitalisation. **Results:** The average age of the overall population at the time of cohort entrance was 75.5 years, with 67.5 percent of them being male. The majority of the patients had comorbidities, with a Charlson comorbidity index score of 3.8. Hypertension (56.25 percent), coronary artery disease (32.5 percent), and stroke were the most often seen comorbidities (32.5 percent). Approximately three-fourths of the patients were put on #2 COPD drugs, and 80 percent of patients had #2 emergency visits for COPD. The average hospital stay was 13.5±15 days. 12.5 percent of patients were admitted to the ICU, with a 9-day average stay. Mechanical breathing was necessary in 7.5 percent of patients, with a median duration of 8 days. Non-invasive ventilation was used in 2.5 percent of the patients. During the index hospitalisation, 9 patients (11.25 percent) died. Nonsurvivors were older than survivors and had a higher Charlson comorbidity index score. **Conclusion:** In conclusion, even if it is the first-ever exacerbation necessitating hospitalisation, it predicts a bad long-term result in COPD patients.
Keywords: COPD, Exacerbation

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INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a long-term condition with significant social, health-care, and economic consequences. After neoplastic illness, ischemic heart disease, and cerebrovascular disorders, it is the fourth leading cause of mortality. [1] However, only COPD mortality has climbed in recent years, and it is anticipated to become the third greatest cause of death in the world by 2020. [2] The prevalence of COPD illness was predicted to be over 251 million cases in 2016 and 3.17 million fatalities in 2015 worldwide, with a rate of roughly 5% deaths each year. [3] The incidence rates were greater in males than in women above the age of 60. [4, 5] As of 2016, COPD was India's second leading cause of mortality. In several population-based studies conducted throughout India, the frequency varied between 2 and 22 percent among males and 1.2 to 19 percent among women. [6] Cigarette smoking is the most frequent cause of COPD, accounting for around 85 to 90 percent of cases. Exposure to ambient smoking, passive smoke, occupational exposure, and genetic susceptibility are some of the other causes of COPD. [7] Shortness of breath, cough (with or without expectoration), fever, chest tightness, and hemoptysis are all frequent symptoms of COPD. [8] The primary aims of COPD therapy are to give clinical relief and lower the risk of recurrent exacerbations, to slow disease progression, and to reduce death. [2] The basic aims of pharmacotherapy are to minimise the intensity of symptoms, enhance general health, and reduce the frequency, complications, and severity of exacerbations. [9]

METHODS AND MATERIALS

The Department of Medicine conducted this prospective research with the agreement of the protocol review committee and the institutional ethics committee. This research included all participants who had been hospitalised for COPD exacerbations. In this research, we classified COPD exacerbations as patients hospitalised with a main diagnosis of COPD or those admitted with a primary diagnosis of pneumonia and a secondary diagnosis of COPD. [10-13] We added the pneumonia codes since it is sometimes difficult to determine whether or not COPD exacerbations are accompanied by pneumonia, and the coexistence of COPD exacerbations and pneumonia is prevalent. [14] In addition, the study group had to have at least two outpatient COPD visits and be prescribed at least two COPD-related drugs within a year. The index hospitalisation was defined

as the first admission for COPD exacerbations during the research period.

In-hospital mortality and one-year mortality following discharge were the outcomes of interest. Demographics, comorbid conditions, concomitant drugs, and COPD treatments are all discussed. COPD-related drugs, including as short- and long-acting b2 agonists, anticholinergics, inhaled corticosteroids, and theophyllines, were assessed in the six months before the first hospitalisation. If comorbidities were present prior to the initial hospitalisation, they were indicated in the Table 1. The Charlson comorbidity index was computed in the manner previously reported. [15] We also gathered data on the index hospitalisation, such as length of stay, frequency and length of intensive care unit (ICU) admission, acute cardiovascular events, use of non-invasive ventilatory assistance, use of mechanical ventilation, and ventilator days. Acute myocardial infarction, unstable angina, acute heart failure, transient ischemic attack, and ischemic stroke were among the cardiovascular events of interest.

RESULTS

This research involved 80 participants. Table 1 summarises the patients' baseline characteristics. The average age of the overall population at the time of cohort entrance was 75.5 years, with 67.5 percent of them being male. The majority of the patients had comorbidities, with a Charlson comorbidity index score of 3.8. Hypertension (56.25 percent), coronary artery disease (32.5 percent), and stroke were the most often seen comorbidities (32.5 percent). Approximately three-fourths of the patients were put on #2 COPD drugs, and 80 percent of patients had #2 emergency visits for COPD. The average hospital stay was 13.5±15 days (Table 3). 12.5 percent of patients were admitted to the ICU, with a 9-day average stay. Mechanical breathing was necessary in 7.5 percent of patients, with a median duration of 8 days. Non-invasive ventilation was used in 2.5 percent of the patients.

OUTCOME

During the index hospitalisation, 9 patients (11.25 percent) died. Nonsurvivors were older than survivors and had a higher Charlson comorbidity index score. Comorbidities such as heart failure, cancer, and stroke were more likely in nonsurvivors; nevertheless, hyperlipidemia was more common in survivors. In individuals who survived the initial hospitalisation, angiotensin II receptor blockers, b blockers, and statins were more typically administered. Nonsurvivors, as predicted, had a lengthier hospital stay and were more likely to need ICU admission and ventilatory assistance (Table 3). Furthermore, nonsurvivors had greater cardiovascular events throughout their hospital stay. According to multivariate logistic regression analysis, increasing age and Charlson comorbidity index score independently predicted in-hospital death (Table 4). Furthermore, using angiotensin II receptor blockers or b blockers was linked to decreased in-hospital mortality.

Table 1: Baseline characteristics of the patients with COPD

Gender	Number	%
Male	54	67.5
Female	26	32.5
Age in years		
Below 30	6	7.5
30-50	11	13.75
50-70	34	42.5
Above 70	29	36.25
Co morbidities		
Coronary artery disease	26	32.5
Hypertension	45	56.25
Liver cirrhosis	29	36.25
Heart failure	22	27.5

Table 2: COPD medications

COPD medications	Total	Survivor	Non survivor	P value
Anticholinergic	22	20	2	0.55
ICS	12	13	1	0.77
Theophylline	53	50	3	0.26
SABA	38	35	5	0.36
LABA	10	8	2	0.87

Table 3: Outcome

		outcome		P value
	Total	**Survivor**	**Nonsurvivor**	
	80	71	9	
Mechanical ventilation	6	4	2	0.001
Duration of Mechanical ventilation (days)	14	6	8	0.55
Non-invasive ventilation	2	1	1	0.001
Cardiovascular events	3	2	1	0.01
Length of hospital stay(days)	13.5± 15	12.5± 12	31.5± 44	0.001
ICU admission	10	8	2	0.001
Length of ICU stay(days)	9± 8	8± 7	12 ± 11	0.005

Table 4: Logistic regression analysis

Parameter	Odds ratio	95% CI	P value
Age, per year	1.16	1.13–1.16	0.001
CCI, per point	1.19	1.11–1.25	0.01
Heart failure	1.45	0.84–1.82	0.12
Hyperlipidemia	0.93	0.62–1.40	0.44
Malignancy	1.48	0.99–2.29	0.17
Stroke	1.28	0.95–1.76	0.43
Use of ARB	0.72	0.48–0.88	0.05
Use of b blocker	0.74	0.51–0.85	0.03
Use of statin	0.51	0.24–1.24	0.09

DISCUSSION

Several studies have shown a significant death risk after hospitalisation for acute COPD exacerbations. Although COPD exacerbations have been extensively researched, the exacerbation under investigation is seldom the first in the patient's disease cycle. A recent research on first-time COPD hospitalizations revealed the likelihood of later severe exacerbations and long-term death in these individuals. [16] Our research also sheds light on the short- and long-term mortality risk factors for a first-time hospitalisation for COPD exacerbations, as well as important events such as in-hospital death and the requirement for ICU care and ventilatory support during the initial hospital stay. The patient ages in both groups were comparable, as were the one-year death rates. Furthermore, both studies showed that greater age and comorbidity scores were significant predictors of death. As a result of their collaboration, the two studies produced a more complete picture of a first-ever severe exacerbation for clinicians caring for COPD patients.

Our findings demonstrate the significant incidence of comorbidities in patients hospitalised for COPD exacerbations, as well as their significance in terms of in-hospital and one-year prognosis in this cohort. Comorbidity severity, as defined by the Charlson comorbidity index, is a well-established predictor of death in stable COPD patients. [17,18] However, the data for hospitalised COPD exacerbations is less consistent. Several studies found no independent relationship between comorbidity load and in-hospital19 or longer-term mortality20,21, despite the fact that several comorbidity indices have been demonstrated to be independently predictive of in-hospital death[22-24] and post-discharge mortality. [25] Differences in research design, source population, and comorbidity grading technique might explain the disparities. In actuality, the GOLD has placed increasing focus over the last decade on the diagnosis and treatment of concomitant diseases in COPD because to their potential influence on patient prognosis. Our data support the notion that an individual patient's health state has a major impact on mortality risk in COPD patients. Because of overlapping risk factors or a direct link, COPD is often related with cardiovascular disorders such as coronary artery disease, heart failure, hypertension, and stroke.[26]

Angiotensin II receptor blockers, b blockers, and statins are popular therapeutic medication classes used in the care of cardiovascular patients, and several studies have shown that they have a protective impact on cardiovascular outcomes.[27-29] These drugs were also related with better outcomes in individuals with severe COPD exacerbations, according to our findings. Statins, as a family of lipid-lowering medicines, have an additional immunomodulatory impact that may reduce neutrophil infiltration, cytokine generation, and matrix remodelling in COPD;[30] hence, statin usage seems physiologically plausible to be related with a reduced risk of COPD exacerbations and death. [31] Despite the findings of a recent large-scale randomised controlled trial[33], it is still recommended that COPD patients with other reasons get a statin. The use of b blockers has long been regarded a contraindication for COPD patients;[33] however, recent studies have argued that starting or continuing b blocker medication in COPD patients with or

without an exacerbation is safe and even beneficial. [34] Aside from cardiovascular protection, b blockers may possibly benefit COPD patients by counteracting sympathetic tone or alleviating ischemia load. [35] Furthermore, as with asthma, persistent dosage of b blockers in COPD patients may give bronchoprotective benefits such as decreased inflammation, mucosal metaplasia, and production of different spasmogenic proteins via activation of b2 adrenoceptors. [36] The renin-angiotensin system may be involved in the aetiology of COPD via its role in the control of pro-inflammatory mediators in the lung. Angiotensin II, in particular, promotes the release of interleukin-6, tumour necrosis factor-a, and monocyte chemotactic protein-1, as well as having an immunomodulatory influence on T cell responses that mediate lung damage in COPD. [37,37] Angiotensin II receptor blockers were shown to decrease the cytokine response of type I alveolar cells to lung damage in a recent research. [38,39] Our results and clinical observations confirm angiotensin II receptor blockers' therapeutic effect in COPD patients.[31,40] Taken together, the beneficial benefits of these medicines on COPD outcomes need special consideration. On the one hand, they highlight the significance of comorbidity control in COPD care. These drugs, on the other hand, may have direct lung protective characteristics and affect the prognosis of COPD patients.

In accordance with previous research[41,42], the current study found that patients with a longer hospital stay and ICU admission had a poorer in-hospital outcome during a COPD exacerbation hospitalisation. We further show that the two factors were independent predictors of death one year after discharge. Longer hospital stays and ICU admission both indicate the severity of acute diseases, which has a detrimental influence on in-hospital prognosis and, to a lesser extent, post-discharge result. [43] Thus, the outcomes of this research suggest that starting post-discharge case management in patients receiving ICU treatment or a lengthy hospital stay during a COPD exacerbation may be beneficial and significant in the goal of improving long-term prognosis.

We discovered that mortality for COPD exacerbations was 11.25 percent in the first year following hospital release, which is comparable to another study's findings.16 Our one-year death rate, however, did not seem to be lower than that of comparable studies that included patients with past severe COPD exacerbations. 25 Indeed, our research cohort was older, which is an independent predictor of post-discharge mortality43, when compared to previous study participants, but our findings highlight the importance of a hospitalised COPD exacerbation, even if it is the first of its kind. In summary, past studies[44], as well as ours, indicate that hospitalizations for a COPD exacerbation identify a COPD subgroup with a bad prognosis. Based on the findings of this research, it is advised that more comprehensive planning and follow-up for these high-risk patients may be necessary, especially if they were older, comorbid, or released after a COPD hospitalisation including a protracted hospital stay or ICU care.

CONCLUSION

In conclusion, even if it is the first-ever exacerbation necessitating hospitalisation, it predicts a bad long-term result in COPD patients. Comorbidities have an important influence in determining mortality risks and should be thoroughly examined and controlled.

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