

Outcome of Ventilatory Supports in Patients with Acute Exacerbation of Chronic Obstructive Pulmonary Disease

Dipti Lama¹, Raj Singh², Bhawana Tiwari³, Farhat Jahan¹, Garima Rijal¹, Ram Narayan Kurmi⁴, Uma Das¹, Laxman Mandal¹

¹Chitwan Medical College,

²Neuro Hospital, Biratnagar,

³Himal Hospital, Kathmandu

⁴Maharajgunj Primary Health Centre, Maharajgunj

ABSTRACT

Introduction: Chronic obstructive pulmonary disease (COPD) leads to significant morbidity and mortality and is the third leading cause of death in the world. The patient having an episode of acute exacerbation of chronic obstructive pulmonary disease (AE of COPD) may require hospital admission including intensive care unit (ICU) admission due to respiratory failure.. Ventilatory support have shown significant outcomes in recovery of the patients. There are limited studies on this subject in Nepal and in our region.

Methods: This retrospective study was conducted to describe clinical profile of patients diagnosed with AE of COPD in Chitwan Medical College Teaching Hospital (CMCTH), a tertiary care centre in Nepal during 1year period from February, 2022 to January, 2023. Data were collected from hospital medical records. All cases of AE of COPD were included in this study after excluding patients with primary diagnosis of restrictive lung disease causing hypercapnia and patients being treated with non-invasive ventilation (NIV) and continuous positive airway pressure (CPAP).

Results: A total of 502 cases presented to our hospital during the one year period. Among them, 64.4% were female. Most of the patients belonged to the age group of 50-80 years. 24.30% were under ventilatory supports. Among all patients (122) under ventilatory supports, 56.55% patients were under non-invasive ventilation (NIV) and 43.44% were under invasive mechanical ventilation (IMV). 21% patients left against medical advice (LAMA), 25% on discharge on request (DOR), 51.99% patients were discharged with full recovery, whereas mortality with treatment was 2.19%.

Conclusion: Patients with AE of COPD were admitted in significant numbers which was seen more prevalent in females and older age group. Ventilatory support is widely used in the management, with NIV being more preferred over IMV and has proven to be effective in reducing complications and mortality rate.

Keywords: AE of COPD, Ventilation

Correspondence:

Laxman Mandal,
Professor
Department of Internal Medicine, Chitwan Medical College
Bharatpur, Nepal
Email: drlaxmanmandal@gmail.com

Introduction

Chronic obstructive pulmonary disease (COPD) is a common respiratory illness characterized by airflow limitation and inflammation of the airways. COPD is the third leading cause of death worldwide, and it is a leading cause of morbidity as well.¹ Smoking is the major environmental risk factor for COPD. Other risk factors include exposure to secondhand smoke, including indoor biomass smoke, and air pollution.^{2,3}

Outcome of Ventilatory Supports in Patients with Acute Exacerbation of Chronic Obstructive Pulmonary

Ventilatory support is a life-saving procedure for patients with selected cases of acute exacerbation of COPD. Noninvasive ventilation (NIV) is the mainstay of treatment during such exacerbations, while invasive mechanical ventilation (IMV) is reserved for more severe cases. Both NIV and IMV have been shown to reduce mortality and improve quality of life in patients with COPD.^{4,5}

Acute exacerbations (AE) are episodes of worsening COPD symptoms that can lead to hospitalization and death. Early identification and treatment of exacerbations can help to prevent complications and improve outcomes and is therefore an essential pre-requisite for optimal outcomes.⁶

This study aimed to describe the clinical profile of patients with acute exacerbation of COPD and the treatment outcomes.

Methodology

Study Design

This is a retrospective study conducted in Chitwan Medical College Teaching Hospital (CMCTH), a tertiary care teaching hospital in central Nepal, in patients diagnosed with AE of COPD from February 2022 to January 2023.

Study Population

The study population consisted of all patients diagnosed with AE of COPD admitted to CMCTH during above mentioned period. The exclusion criteria were: patients with primary diagnosis of restrictive lung disease causing hypercapnia and patients being treated with NIV or Continuous positive airway pressure (CPAP).

Data Collection

Data on patients' demographic variables, treatment and outcome were collected from patients' medical records. This study was approved by the ethical committee of our institution

Statistical analysis

The collected data were entered organized in Microsoft Excel. Data analysis was performed using IBM SPSS (Statistical package for Social Sciences) version 21 and data are presented as count or and percentage.

Results

Among 502 patients, there were 322 (64.14%) females with a ratio of 1.78. The mean age of the patients was 72.67±9.21 years. Most patients belong to the age group of 50-80 years (Table 1).

Table 1: Age distribution of patients with COPD (n=502)

Age (Years)	n (%)
Up to 40	2 (0.39)
41-50	5 (0.99)
51-60	38 (7.56)
61-70	177 (35.25)
71-80	180 (35.85)
81-90	90 (17.92)
>90	10 (1.99)

Shortness of breath 483 (96.21%) was the most common clinical presentation followed by cough 310 (61.75%) and fever 118 (23.50%) (Table 2).

Table 2: Clinical presentation of patients with COPD (n=502)

Clinical presentation	n (%)
Shortness of breath	483 (96.21)
Cough	310 (61.75)
Fever	118 (23.50)
Swelling of body	35 (6.97)
Altered sensorium	24 (4.78)

Smoking was the most common risk factor of COPD. In our study, 128 (25.49%) patients currently used some form of smoking whereas 328 (65.33%) were past smoker (Fig1 and table 3). Non-smoker who developed COPD was probably due to prolonged exposure to domestic smokes.

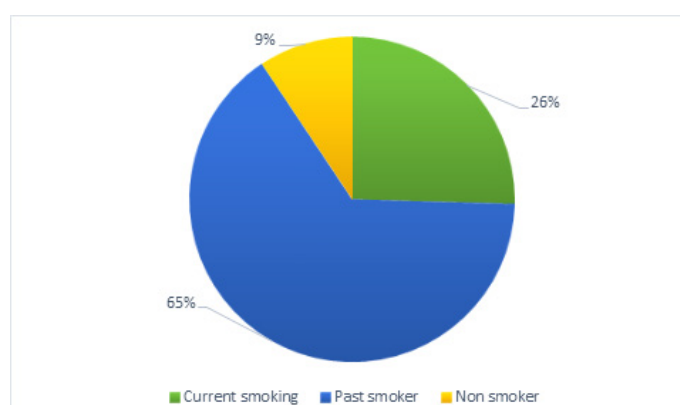


Fig 1: Distribution of patients according to their smoking status (n=502)

Among 502 patients, 261 (51.99%) were discharged normally whereas 11 (2.19%) died during their hospital stay (Fig 2)

Outcome of Ventilatory Supports in Patients with Acute Exacerbation of Chronic Obstructive Pulmonary

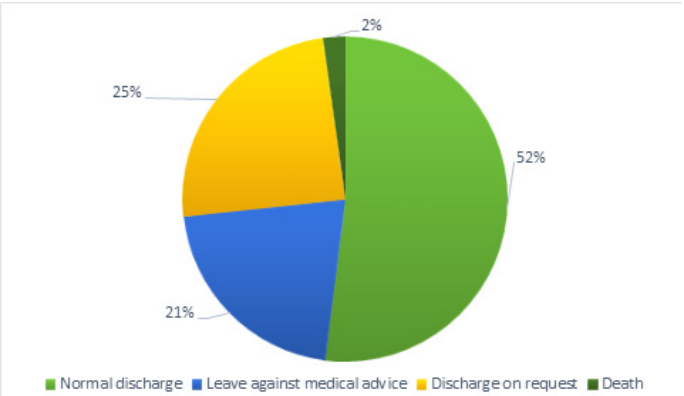


Fig 2: Distribution of patients according to outcome (n=502)

Among 502 patients, 122 (24.30%) patients were under ventilatory support. Out of 122, there were 69 (56.55%) patients under non-invasive ventilation (NIV) and 53 (43.44%) under invasive mechanical ventilation (IMV) (Fig 3).

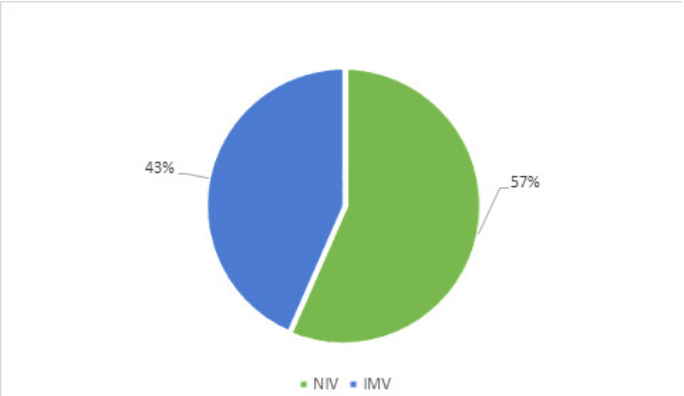


Fig 3: Distribution of patients according to type of ventilation support (n=122)

Out of 122 patients on ventilatory support, there were 55 (45.08%) male and 67 (54.92%) female. The mean hospital stay and ICU stay among the patients with ventilatory support was 5.48 ± 3.48 and 4.40 ± 3.10 days respectively and was higher than those without ventilatory support. Similarly, among 11 cases of in-hospital mortality, 6 (54.54%) were under ventilator support.

Table 3. Distribution of demographic and clinical variables in patients with and without ventilatory support.

Variables	Ventilator support	
	Yes	No
Age	73.32±9.40	72.46±9.15
Gender		
Male	55	125

Female	67	255
Smoking status		
Current smoker	25	103
Nonsmoker	9	38
Past smoker	88	240
Hospital stays (days)	5.48±3.48	4.21±2.45
ICU stays (days)	4.40±3.10	1.34±1.98
Mortality	6	5

Discussion

COPD is one of the major public health problems worldwide and acute exacerbation contribute substantially to morbidity and mortality.⁷ In many cases, mostly in severe cases of AE of COPD, despite pharmacological treatment, ventilatory supports are necessary. Ventilatory supports are life-saving procedures and have shown significant improvement in morbidity and mortality rates in AE of COPD patients.^{4,5}

In our study, we found higher incidence of AE of COPD in female (64.14%) which is similar to studies shown by.^{2,3} Most patient (35.85%) belonged to age group 50-80 years which is similar to other studies.⁸ of the patients were found to have smoking history where, 25.49% were active smoker and 65.33% were past smokers. Similar findings were also seen in other studies.^{2,3,8}

The most common clinical presentation was shortness of breath (96.21%) followed by cough (61.75%) and fever (23.50%). Other common clinical features were swelling of the body and altered sensorium. Among the patients that were admitted, 25% of patients with AE of COPD required ventilatory support, among which 56.55% were under non-invasive ventilation (NIV) and 43.44% were under invasive mechanical ventilation (IMV). Similar findings were found in other study.⁹

Among all the patients that were admitted, 52% made full recovery and were discharged normally whereas mortality was 2.19%. Among 11 (2.19%) cases of in hospital mortality, 6 (54.54%) were under ventilatory supports. Patients who died even under ventilatory supports was probably due to serious conditions and other comorbidities.

Conclusion

In this study, most patients with AE of COPD required ventilatory support (either non-invasive ventilation or invasive ventilation). Over half of patients were discharged after making full recovery while some patients went on to receive long-term oxygen therapy. The mortality rate was low. This information is useful for peripheral hospitals in developing countries, as many lack ICU facilities and

ventilatory supports.

References

1. Erhabor G, Adeniyi B, Arawomo A, Akinwalere O, Adetona G, Fagbohun F, et al. Acute Exacerbation of COPD: Clinical Perspectives and Literature Review. *West African Journal of Medicine*. 2021;38(11):1129-42.
DOI: [10.55891/wajm.v38i11.25](https://doi.org/10.55891/wajm.v38i11.25)
2. Budhathoki P, Shrestha DB, Sedhai YR, Baniya R, Bhatt A, Chaudhary K, et al. Prevalence and risk factors of COPD in Nepal: a systematic review and meta-analysis. 2021.
DOI: [10.1164/ajrccm-conference.2021.203.1_MeetingAbstracts.A2273](https://doi.org/10.1164/ajrccm-conference.2021.203.1_MeetingAbstracts.A2273)
3. Bhandari R, Sharma R. Epidemiology of chronic obstructive pulmonary disease: a descriptive study in the mid-western region of Nepal. *International journal of chronic obstructive pulmonary disease*. 2012;253-7.
DOI: [10.2147/COPD.S28602](https://doi.org/10.2147/COPD.S28602)
PMID: 22563245 PMCID: PMC3340115
4. Wakatsuki M, Sadler P. Invasive Mechanical Ventilation in Acute Exacerbation of COPD: Prognostic Indicators to Support Clinical Decision Making. *Journal of the Intensive Care Society*. 2012;13(3):238-43.
DOI: [10.1177/175114371201300314](https://doi.org/10.1177/175114371201300314)
5. Ahmed SM, Athar M. Mechanical ventilation in patients with chronic obstructive pulmonary disease and bronchial asthma. *Indian journal of Anaesthesia*. 2015;59(9):589.
DOI: [10.4103/0019-5049.165856](https://doi.org/10.4103/0019-5049.165856)
PMID: 26556918 PMCID: PMC4613406
6. Oliveira A, Munhá J, Bugalho A, Guimarães M, Reis G, Marques A. Identification and assessment of COPD exacerbations. *Pulmonology*. 2018;24(1):42-7.
DOI: [10.1016/j.rppnen.2017.10.006](https://doi.org/10.1016/j.rppnen.2017.10.006)
PMID: 29279278
7. Ko FW, Chan KP, Hui DS, Goddard JR, Shaw JG, Reid DW, et al. Acute exacerbation of COPD. *Respirology*. 2016;21(7):1152-65.
DOI: [10.1111/resp.12780](https://doi.org/10.1111/resp.12780)
PMID: 27028990 PMCID: PMC7169165
8. Pokharel P, Lamichhane P, Pant P, Shrestha AB. Factors affecting length of hospital stay in chronic obstructive pulmonary disease patients in a tertiary hospital of Nepal: A retrospective cross-sectional study. *Annals of Medicine and Surgery*. 2022;80:104246.
DOI: [10.1016/j.amsu.2022.104246](https://doi.org/10.1016/j.amsu.2022.104246)
PMID: 36045760 PMCID: PMC9422293
9. Lindenauer PK, Stefan MS, Shieh M-S, Pekow PS, Rothberg MB, Hill NS. Outcomes associated with invasive and non-invasive ventilation among patients hospitalized with exacerbations of chronic obstructive pulmonary disease. *JAMA internal medicine*. 2014;174(12):1982-93.
DOI: [10.1001/jamainternmed.2014.5430](https://doi.org/10.1001/jamainternmed.2014.5430)
PMID: 25347545 PMCID: PMC4501470
10. Subedi M, Bhatta N, Rijal S, Maskey R, Koirala P, Peeyush D. NON INVASIVE VENTILATION (NIV) IN PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD) WITH HYPERCAPNIC RESPIRATORY FAILURE. *European Journal of Biomedical*. 2016;3(10):348-53.