DOI: 10.7860/JCDR/2026/80318.23471

Original Article

Internal Medicine Section

Prognostic Relevance of the Modified DECAF Score for Predicting In-hospital Mortality in Acute Exacerbations of Chronic Obstructive Pulmonary Disease: A Prospective Observational Study

ANJALY ANOOPKUMAR[1], SUPRIYA ADIODY[2], UNNI R BABY[3]

ABSTRACT

Introduction: Chronic Obstructive Pulmonary Disease (COPD) remains the third leading cause of death globally, with a particularly high burden in Low and Middle-Income Countries (LMIC). Accurate risk stratification during Acute Exacerbation of Chronic Obstructive Pulmonary Disease (AECOPD) is crucial for optimising treatment and resource allocation. The modified DECAF score can be used as a simple bedside tool designed to predict in-hospital mortality and guide clinical decision making.

Aim: The present study aimed to evaluate the prognostic utility of the Modified DECAF (Dyspnoea, Eosinopenia, Consolidation on CXR, Acidaemia, and atrial Fibrillation) score in predicting in-hospital mortality among patients admitted with AECOPD. Additionally, it seeks to identify clinical variables associated with prolonged hospital stay and overall patient outcomes during AECOPD admissions.

Materials and Methods: A prospective observational study was conducted from November 2022 to May 2024 in the Department of Respiratory Medicine at Jubilee Mission Medical College and Research Institute, Thrissur, Kerala, India, Eighty-eight patients with COPD, diagnosed as per Global Initiative for Chronic Obstructive Lung Disease (GOLD) criteria and supported by spirometric evidence of airflow obstruction during clinical stability and coming with an acute exacerbation were included. The modified DECAF score cut-off was determined using a Receiver Operating Curve (ROC) curve. Sensitivity, specificity, Positive Predictive Value (PPV), and Negative Predictive Value (NPV) were calculated. Variables influencing prolonged hospital stay and outcomes were analysed using the Chi-square test.

Results: The modified DECAF score showed excellent accuracy in predicting in-hospital mortality in AECOPD (AUC=0.963). A cut-off score of 3.5 achieved 100% sensitivity, 89.04% specificity, and a 65.22% PPV. Given its high sensitivity and reliability, the modified DECAF score is a valuable tool for risk stratification in AECOPD patients. Patients with higher modified DECAF scores had longer hospital stays and poorer outcomes. The mean duration of hospitalisation was 8.2±3.6 days. Requirement for oxygen therapy, non-invasive, or invasive ventilation was associated with increased mortality ($p<0.005$). Although females, current smokers, and those with comorbidities showed a trend toward prolonged hospitalisation, these differences were not statistically significant.

Conclusion: The modified DECAF score achieved maximum sensitivity at a cut-off of 3.5, proving its utility in guiding care decisions. It aids in determining the appropriate level of care, suitability for early discharge, and end-of-life considerations, ultimately reducing morbidity and mortality while optimising resource utilisation.

Keywords: Acidaemia and atrial fibrillation, Consolidation on chest x-ray, Dyspnoea, Eosinopenia, Pulmonary disease, Risk stratification

INTRODUCTION

The COPD is a heterogeneous lung condition characterised by chronic respiratory symptoms and airflow limitation. It can be periodically punctuated by acute worsening of symptoms characterised clinically by increased dyspnoea, cough, sputum production and/or purulence [1]. This acute worsening of symptoms has been termed AECOPD. Exacerbations are common and have important clinical and economic consequences which include loss of productivity, decline in quality of life, temporary or permanent decrement in pulmonary functions and exercise capacity, hospitalisation and sometimes even death [2].

According to World Health Organisation (WHO) data, COPD ranks as the third most common cause of death globally, with 3.23 million fatalities reported in 2021. In LMIC, nearly 90% of COPD related deaths in individuals under 70 occur. COPD is the seventh most significant cause of health issues worldwide, as measured by Disability-Adjusted Life Years (DALYs). In high-income nations, tobacco smoking is responsible for over 70% of COPD cases, whereas in LMIC, tobacco smoking accounts for 30-40% of cases, with household air pollution emerging as a significant risk factor [3].

From a pathophysiological standpoint, it is characterised by chronic airflow limitation, airway inflammation, and structural remodeling [4], and can often be recognised through distinctive physical signs on clinical examination [5].

In the Indian context, the prevalence of COPD is approximately 5.8% among adults aged 35 years and older, with the 2019 Global Burden of Disease (GBD) report estimating 37.8 million cases, underscoring the disease's significant burden [6]. COPD ranks as the second leading cause of death and DALYs in the country [6]. A study by Salvi S and Ghorpade D further reported a prevalence of 7.4%, with 11% in urban and 5.6% in rural areas [6]. The prevalence rises sharply after the age of 30, with COPD accounting for 9.5% of total deaths and more than 50% of the chronic respiratory disease burden, including 70% of Years Lived with Disability (YLDs) [6]. The problem is compounded by India's high exposure risks, including 120 million tobacco smokers, widespread biomass fuel use, and mosquito repellents in 56-76% of households, suggesting that the true burden may approach 50 million cases [6].

It is thought that mortality related to AECOPD could be improved, if accurate and early predictive tools and interventions are adopted. However, the performance of these tools cannot be guaranteed and require validation. The score DECAF score is a validated prognostic tool for predicting in-hospital mortality among patients admitted with acute exacerbations of COPD. It is simple, bedside applicable, and uses routinely available clinical and laboratory parameters [7]. However, atrial fibrillation - one of the original components is relatively uncommon in many patient populations, especially in India. To improve applicability, the Modified DECAF (mDECAF) score replaces atrial fibrillation with the number of hospital admissions in the previous year, thereby better reflecting the impact of frequent exacerbations and disease burden in these patients [8]. This modification may enhance its prognostic accuracy in settings like India, where repeated hospitalisations are more common, while atrial fibrillation is less prevalent.

There is limited published literature from Kerala and South India evaluating the prognostic performance of the mDECAF score. Most existing studies are from Western populations, where risk profiles and comorbidities differ. Importantly, in India, tuberculosis-associated obstructive airway disease is relatively common, unlike in Western countries, and may influence the natural history and prognosis of COPD. The present study evaluates the prognostic utility of the Modified DECAF score in predicting in-hospital mortality and examines factors associated with prolonged hospital stay and outcomes in patients admitted with AECOPD.

MATERIALS AND METHODS

The present prospective observational study was conducted from November 2022 to May 2024 in the Department of Respiratory Medicine at Jubilee Mission Medical College and Research Institute, Thrissur, Kerala, India, following approval from the Institutional Ethics Committee (IEC approval no: 46/22/IEC/JMMC&RI). Written informed consent was obtained from all participants prior to enrolment, and confidentiality of patient information was strictly maintained.

Sample size calculation: The sample size was calculated as 88 patients, based on the sensitivity of the DECAF score reported in a previous study by Sangwan V et al., with a 95% confidence level, 80% power and a 5% relative allowable error [9].

Inclusion criteria: Patients with age > 50 years, with a prior diagnosis of COPD according to GOLD criteria supported by spirometric evidence of airflow obstruction (Forced Expiratory Volume in one second (FEV1)/Forced Vital Capacity (FVC) <0.70) when clinically stable, presenting with acute exacerbation were included in this study [10].

Exclusion criteria: Patients who were not willing to participate in the study were excluded. Additionally, individuals with diseases that could mimic AECOPD were not included. These conditions include acute exacerbation of bronchial asthma, bronchiectasis, and interstitial lung diseases. Patients with malignancies, acute-on-chronic decompensated liver or renal disease, and coronary artery disease were also excluded. Furthermore, individuals with psychiatric illnesses that may interfere with study participation was not considered.

Patients with the prior diagnosis of COPD according to GOLD criteria satisfying the inclusion and exclusion criteria were included in this study. AECOPD are episodes of worsening respiratory symptoms, particularly dyspnoea, cough, and sputum production, that go beyond normal day to-day variations and require a change in management.

In the present study, the primary outcome variable assessed was in-hospital mortality among patients admitted with AECOPD. The main predictor variables were derived from the components of the mDECAF score, which included the severity of dyspnoea as measured by the extended Medical Research Council (MRC) dyspnoea scale, presence of eosinopenia (blood eosinophil count $<0.05\times10^9$/L), radiological evidence of consolidation on chest X-ray, acidemia (pH <7.30 on ABG analysis), and the number of hospital admissions in the preceding year [7,8,11]. In addition to these, demographic and clinical variables such as age, sex, smoking history, duration of COPD, comorbid conditions including tuberculosis-associated obstructive airway disease, and staging of COPD as per the GOLD criteria were also evaluated [9]. Secondary clinical outcomes such as length of hospital stay, need for Intensive Care Unit (ICU) admission, requirement of ventilatory support (non-invasive or invasive), and readmission within 30 days were considered for further analysis [12,13]. This comprehensive set of variables was studied to determine the prognostic utility of the mDECAF score in predicting adverse outcomes in AECOPD. Variables found to be significant in univariate analysis ($p<0.05$) were included in a multivariate logistic regression model to identify independent predictors of in-hospital mortality. A p-value <0.05 was considered statistically significant.

Study Procedure

Patients underwent a comprehensive evaluation, including complete history taking, general and local examination, plain chest X-ray, Arterial Blood Gas (ABG) analysis, and a 12-lead ECG. The Modified DECAF score includes five variables: dyspnoea assessed by the extended MRC scale (0-2 points), eosinopenia ($<0.05\times10^9$/L; 1 point), radiographic consolidation (1 point), acidaemia (pH <7.30; 1 point), and either atrial fibrillation or an alternative variable such as frequent hospitalisations (1 point), giving a total score range of 0-6.

Patients were followed throughout their hospital stay to determine clinical outcomes, categorised as IMPROVED (clinical improvement), EXPIRED (patients who passed away during hospitalisation), or STATUS QUO (no symptom improvement).

STATISTICAL ANALYSIS

Data were entered in Microsoft Excel and analysed using IBM Statistical Package for Social Sciences (SPSS) Statistics for Windows, Version 25.0. To establish the cut-off value of the Modified DECAF score, a Receiver Operating Characteristic (ROC) curve was applied, followed by the calculation of sensitivity, specificity, PPV, and NPV. Additionally, the Chi-square test was used to analyse variables affecting prolonged hospital stay and patient outcomes in acute exacerbations of COPD.

RESULTS

A total of 88 patients admitted with acute exacerbation of COPD were evaluated. The mean age was 74.9±8.8 years, with a male predominance (75%). More than two-thirds had a smoking history, including 42.0% ex-smokers, 26.1% current smokers, and 31.8% never-smokers. The most common Co-morbidities were hypertension (42%), diabetes mellitus (31%), Ischemic Heart Disease (IHD) (20%), and post-tuberculosis sequelae (11.4%) [Table/Fig-1].

At admission, 42.1% of patients presented with severe dyspnoea (eMRCD grade 5b), which improved significantly by discharge, with only 1.1% persisting at this grade. Acidosis was documented in 33% and alkalosis in 67% of patients. Chest X-ray consolidation was observed in 42.1%, while atrial fibrillation was present in 9.1%. Nearly half of the cohort (44.3%) reported at least one hospitalisation in the previous year [Table/Fig-2].

Variables	n (%)
Age (years)	74.86±8.79
Male	66 (75.0%)
Female	22 (25.0%)
Smoking status	
Current smokers	23 (26.1%)
Ex-smokers	37 (42.0%)
Non-smokers	28 (31.8%)
Co-morbidities	
Hypertension	37 (42.0%)
Diabetes mellitus	27 (30.7%)
IHD	20.5%
Post-TB sequelae	11.4%

[Table/Fig-1]: Baseline characteristics of study participants (N=88).
TB: Tuberculosis

Parameters	n (%)
Dyspnoea grade 5b at admission	37 (42.0%)
Dyspnoea grade 5b at discharge	1 (1.1%)
ABG acidosis (pH <7.30)	29 (33.0%)
ABG alkalosis	59 (67.0%)
Chest X-ray consolidation	37 (42.1%)
ECG atrial fibrillation	8 (9.1%)
Previous hospitalisation ≥1/year	39 (44.3%)

[Table/Fig-2]: Clinical and investigative findings.

With regard to supportive care, 21.6% required oxygen therapy, 20.5% Non-Invasive Ventilation (NIV), and 19.3% invasive mechanical ventilation. The mean duration of hospitalisation was 8.2±3.6 days [Table/Fig-3].

Parameters	n (%)
Oxygen support	19 (21.6%)
Non-Invasive Ventilation (NIV)	18 (20.5%)
Invasive ventilation	17 (19.3%)
ICU admission	44 (50%)
Mean hospital stay (days)	8.2±3.6

[Table/Fig-3]: Requirement of supportive care.

The overall in-hospital mortality rate was 17% (15/88). Mortality was significantly higher in males (19.7%) compared to females (9.1%, p<0.001), and was most pronounced among ex-smokers (24.3%), followed by current smokers (13.6%) and non-smokers p<0.001. Requirement for oxygen support (36.7%, p=0.004), Non-Invasive Ventilation (NIV) (51.9%, p<0.001), and invasive ventilation (76.5%, p<0.001) was strongly associated with increased mortality. Presence of comorbidities did not significantly influence outcomes [Table/Fig-4].

Risk stratification by Modified DECAF score revealed that 40.9% of patients were in the low-risk group (scores 0-1), 18.2% in the intermediate-risk group (score 2), and 40.9% in the high-risk group (scores 3-6). All 15 deaths occurred exclusively within the high-risk group, with a mortality rate of 41.7%. No deaths were reported in the low- or intermediate-risk categories [Table/Fig-5].

ROC analysis demonstrated excellent discriminatory performance for the Modified DECAF score, with an AUC of 0.963 [Table/Fig-6].

At the optimal cut-off of 3.5, sensitivity and NPV were both 100%, while specificity and PPV were 89.0% and 65.2%, respectively [Table/Fig-7].

On multivariable logistic regression, the Modified DECAF score was an independent predictor of in-hospital mortality. Each one-point increase in the score was associated with an adjusted odds ratio of 8.21 (95% CI 2.45-27.47, p=0.001). Neither age nor sex independently predicted mortality [Table/Fig-8].

The mean hospital stay was 8.2±3.6 days. Although females, current smokers, those with combined diabetes and hypertension, and patients requiring oxygen or ventilatory support tended to have longer hospitalisations, these differences were not statistically significant [Table/Fig-9].

DISCUSSION

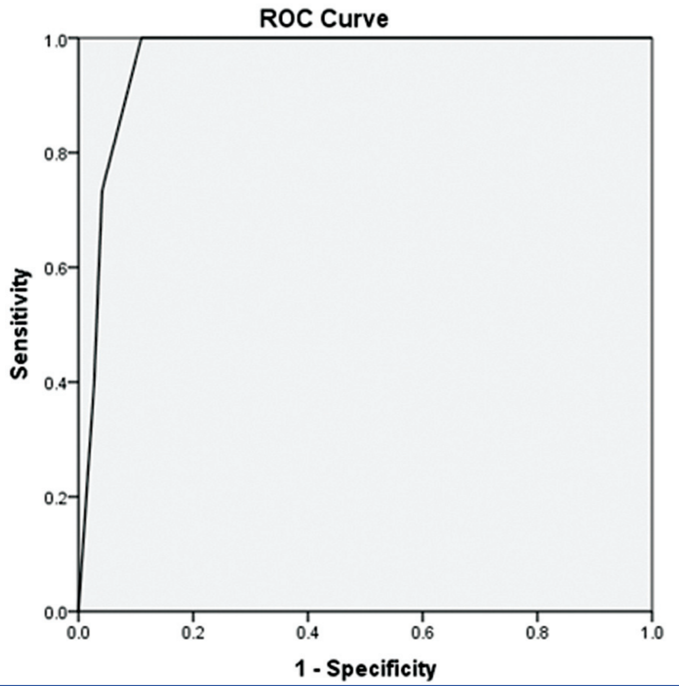
This study aimed to evaluate "The prognostic significance of the modified DECAF score in predicting hospital mortality during AECOPD". It emphasised the limited research available on this topic in South Indian literature and underscored the importance of assessing the modified DECAF score's effectiveness in predicting hospital mortality. In the present study, the ROC curve was plotted [Table/Fig-1] using the modified DECAF score to assess its predictive power for in-hospital mortality. A cut-off of 3.5 was identified, at which the modified DECAF score demonstrated maximum sensitivity and specificity for predicting mortality. At this cut-off, sensitivity and NPV were both 100%, while specificity was 89.04% and PPV was 65.22%. With its 100% sensitivity and good specificity, the modified DECAF score with a cut-off of 3.5 proved to be an effective tool for predicting in-hospital mortality from acute exacerbation of COPD with an AUROC of 0.963.

Variables	Category	Expired (n=15)	Improved (n=70)	Status quo (n=3)	Mortality (%)	p-value
Gender	Male (n=66)	13	51	2	19.7%	<0.001
	Female (n=22)	2	19	1	9.1%	
Smoking Status	**Expired (n)**	**Improved (n)**	**Status Quo (n)**	**Total (n)**	**% Expired**	**p-value**
Non-smoker	3	24	1	28	10.7%	<0.001
Ex-smoker	9	27	1	37	24.3%	
Current smoker	3	19	1	23	13.6%	
Total	15	70	3	88	—	—
Co-morbidity	Present (n=61)	10	49	2	16.3%	<0.001
	Absent (n=27)	5	21	1	18.5%	
Oxygen support	Yes (n=30)	11	18	1	36.7%	0.004
	No (n=58)	4	52	2	6.9%	
NIV	Yes (n=27)	14	12	1	51.9%	<0.001
	No (n=61)	1	58	2	1.7%	
Invasive Ventilation	Yes (n=17)	13	4	0	76.5%	<0.001
	No (n=71)	2	66	3	2.8%	

[Table/Fig-4]: Predictors of mortality in patients with AECOPD (n=88).
NIV: Non-Invasive Ventilation; Data are expressed as frequencies (n). The association between smoking status and clinical outcome was analysed using the Chi-square test. A p-value <0.05 was considered statistically significant

Risk Group	Score range	No. of patients (n=88)	Deaths (n=15)	Mortality rate (%)
Low-risk	0-1	36	0	0%
Intermediate-risk	2	16	0	0%
High-risk	3-6	36	15	41.7%

[Table/Fig-5]: Risk Stratification by Modified DECAF Score (Low: 0-1, Moderate: 2, High: 3-6).



[Table/Fig-6]: ROC curve of modified DECAF score. The area under the curve (AUC)=0.963.
The cut-off was taken as 3.5 at which maximum sensitivity and specificity of modified DECAF score was observed in predicting the mortality. It was found that for a cut-off score of 3.5, sensitivity and NPV were 100% while specificity was found to be 89.04% and PPV to be 65.22%. Considering a 100% sensitivity and a good specificity, modified DECAF score with 3.5 as cut-off can be taken as a useful tool in predicting the in-hospital mortality from acute exacerbation of COPD

Parameters	Values
Area under ROC curve (AUC)	0.963
Optimal cut-off score	3.5
Sensitivity	100%
Specificity	89.0%
Positive Predictive Value (PPV)	65.2%
Negative Predictive Value (NPV)	100%

[Table/Fig-7]: ROC Analysis of modified DECAF score for mortality Prediction.

Variables	aOR	95% CI	p-value
Modified DECAF (per point)	8.21	2.45-27.47	0.001
Age (per year)	0.95	0.85-1.05	0.311
Male (vs Female)	16.29	0.999-265.70	0.050

[Table/Fig-8]: Multivariable logistic regression for in-hospital mortality.

Variables	Subgroup	Mean Stay (days)±SD	p-value	Significance
Gender	Male	6.70±2.10	0.402	Not significant
	Female	7.26±2.62		
Age	Correlation (r=0.058)	–	0.590	Not significant
Comorbidity	Diabetes	6.58±1.61	0.268	Not significant
	Hypertension	6.39±2.09		
	Diabetes+ hypertension	7.84±2.04		
	Others	6.82±2.58		
O_2 Support	Yes	7.43±2.43	0.076	Not significant
	No	6.50±1.98		
NIV	Yes	7.37±2.59	0.166	Not significant
	No	6.58±1.95		
Invasive Ventilation	Yes	7.12±2.64	0.132	Not significant
	No	6.75±2.06		
Smoking status	Current smoker	7.29±2.64	0.797	Not significant
	Ex-smoker	6.51±1.95		
	Never-smoker	6.92±2.95		

[Table/Fig-9]: Association of variables with duration of hospital stay.
NIV: Non-Invasive Ventilation

The average age of the 88 COPD study participants was 74.86 years, with a standard deviation of 8.79 years, and the majority were over 50-year-old. Males constituted 75% of the study population. Approximately, 23.86% of the participants were housewives who were nonsmokers, thus emphasising the fact that exposure to biomass fuel had a significant impact on development of COPD, and 20% were farmers. A significant portion of the participants had occupations such as brick workers, construction workers, manual labourers, and grocery store workers.

Current smokers accounted for 26.28% of the participants, while 42.27% were ex-smokers, showing that 70% had a smoking history. The mean pack-year was 49.6, and the mean smoking index was 450.68. Previous hospitalisations were noted in 3.4% with two occurrences, 3.4% had 4 occurrences, and 21.6% required oxygen support. These data collectively indicate that COPD in our study population was strongly associated with smoking exposure, accompanied by a high burden of comorbidities and frequent hospital admissions- consistent with the known natural history and systemic impact of COPD.

In the present study, 66% of participants exhibited alkalosis, while 33% had acidosis. Chest X-rays revealed consolidation in 42% of cases, and ECGs showed atrial fibrillation in 9%. More than 20% required oxygen and NIV support, and 19% needed invasive ventilation. At admission, 42.05% had grade 5b dyspnoea, but by discharge, only 1.14% remained at this severity. A total of 17.05% of participants passed away, while the majority showed improvement. These findings highlighted a significant improvement in dyspnoea management, despite a notable mortality rate.

In a study by Sharma S et al., a mortality rate of 42% was observed in patients admitted with eMRCD Grade 5b, compared to a 19% mortality rate among those with eMRCD Grade 5a, which was consistent with our study [8]. In the study by Zidan MH et al., 16% of patients presented with dyspnoea grade eMRCD 0-4 (score 0), 59% with eMRCD 5a (score 1), and 25% with eMRCD 5b (score 2). [14] Meanwhile, Choudhary KD et al., reported that 74 patients with dyspnoea (eMRCD 0-4) scored 0, while 25 patients with dyspnoea (eMRCD 5a) scored 1, and 13 patients with dyspnoea (eMRCD 5b) scored 2 similar to ours [15].

Meanwhile, in a study by Wang Z et al., the prevalence of COPD was higher in males compared to females (2.59% vs. 0.72%), with an odds ratio of 4.6 for males, aligning with our findings. The majority of patients (60%) were current smokers, similar to our study. However, the mean age in their study was above 40 years, which was lower compared to the mean age observed in our research [16]. However, our study identified a higher mean age of approximately 74.89 years in COPD participants, with nearly 75% being male.

Moreover, Vonk JM et al., noted that in India, where over 70% of people use biomass fuel for cooking compared to a smoking prevalence of only 25%, exposure to biomass fuel might be a more significant risk factor for COPD. This aligns with our study's higher COPD prevalence among homemakers [17].

Meanwhile, in a study by Zidan MH et al., they reported a modified DECAF score sensitivity of 70.59% and a specificity of 89.16%, findings that were consistent with our research [18]. Kumar KA et al., also observed a strong predictive ability of the modified DECAF score for in-hospital mortality, with an AUROC of 0.95, consistent with our findings. Their study presented comparable sensitivity (100%) and specificity (86.81%) due to similar patient characteristics [19]. Further, Gomes L et al., also demonstrated that DECAF and mDECAF scores were superior in predicting in-hospital mortality, length of hospital stays, and ICU admissions, with higher scores significantly linked to increased mortality (p<0.001), consistent with our results. Although their study demonstrated high sensitivity (88%) similar to ours, they had lower specificity (22%) likely due to varying patient characteristics and different cut-off values [20]. The results highlighted the importance of choosing appropriate DECAF cut-off scores lies in accurately calculating sensitivity and specificity, which can impact the predictive power of the score across different studies.

Accordingly, in a study by Sharma S et al., the mortality data revealed that approximately 70% of patients categorised in the high-risk group (scores 4-6) did not survive, while about 7% of those in the intermediate-risk group (score 3) succumbed. Notably, no fatalities were reported among patients in the low-risk category (scores 0-2). This outcome aligns with our findings, where 65% of individuals in the high-risk category did not survive. Hence, Modified DECAF score is a strong predictor of in-hospital mortality in patients admitted with AECOPD. Length of hospital stay increased with progressively increasing modified DECAF scores, so it can help to identify cases that can be safely discharged early and those who will need prolonged hospitalisation [8].

Meanwhile, Mohammed H et al., found that the modified DECAF score had a strong predictive ability for in-hospital mortality, with an AUROC of 0.95, closely aligning with our findings. Their study also showed high sensitivity (100%) and specificity (86.81%), consistent with our results [18].

Our study showed that among those with a modified DECAF score of ≥3.5, 15 participants expired (65%), while eight survived. All 65 participants with a modified DECAF score ≥3.5, 15 participants expired (65%), while eight survived. All 65 participants with a modified DECAF score < 3.5 survived, with no deaths reported in this group. These results indicated that a modified DECAF score of ≥3.5 was strongly associated with in-hospital mortality in COPD patients. The mean modified DECAF score was found to be 2.27±1.8, indicating a moderate risk level for the study population. In our study, a significantly higher proportion of participants who required O2 support, NIV, or invasive ventilation were found to have expired. Additionally, a significant number of ex-smokers had expired compared to nonsmokers or current smokers, with both results showing a p-value <0.05 These findings suggested that the need for advanced respiratory support and a history of smoking were strong predictors of mortality in COPD patients.

Despite numerous commonalities, certain studies exhibited slight variations in the final outcomes. The discrepancies in our study's parameters could be due to a relatively smaller sample size, diverse study designs, geographic and factors, demographic variability, distinct prior respiratory diseases, varied assessment methods, differing cut-off values used in modified DECAF, interobserver differences, different standards applied, and varying levels of clinical expertise.

Limitation(s)

The present study was conducted at a single center with a relatively small sample size and short follow-up period. Future research should include larger, multi-center prospective studies with longer follow-up durations and assessment of post-discharge outcomes, such as 30 and 90-day mortality.

CONCLUSION(S)

The present study demonstrates that the modified DECAF score is a simple, objective, and highly reliable tool for early risk stratification in patients hospitalised with AECOPD. Mortality was confined entirely to patients classified as high-risk. The modified DECAF score showed excellent predictive accuracy for in-hospital mortality with 100% sensitivity and NPV at a cut-off of ≥3.5, and an adjusted odds ratio of 8.21 for each one-point increase. The results highlight that incorporating the modified DECAF score into routine AECOPD assessment can facilitate timely escalation of care, appropriate allocation of critical care resources, and more informed clinical decision-making, especially in resource-limited settings.

REFERENCES

[1] Seemungal TA, Donaldson GC, Paul EA, Bestall JC, Jeffries DJ, Wedzicha JA. Effect of exacerbation on quality of life in patients with chronic obstructive pulmonary disease. Am J Respir Crit Care Med. 1998;157(5 Pt 1):1418-22. Doi:10.1164/ajrccm.157.5.9709032. PMID: 9603117.

[2] Kanner RE, Anthonisen NR, Connett JE; Lung Health Study Research Group. Lower respiratory illnesses promote FEV1 decline in current smokers but not ex-smokers with mild chronic obstructive pulmonary disease: Results from the Lung Health Study. Am J Respir Crit Care Med. 2001;164(3):358-64.

[3] World Health Organization. Chronic obstructive pulmonary disease (COPD) [Internet]. Geneva: WHO; 2024 [cited 2024 Aug 9]. Available from: https://www.who.int/news-room/fact-sheets/detail/chronic-obstructive-pulmonary-disease-(copd).

[4] MacNee W. Pathology, pathogenesis, and pathophysiology. BMJ. 2006;332(7551):1202-04. Doi: 10.1136/bmj.332.7551.1202.

[5] Sarkar M, Bhardwaz R, Madabhavi I, Modi M. Physical signs in patients with chronic obstructive pulmonary disease. Lung India. 2019;36(1):38-47. Doi:10.4103/lungindia.lungindia_145_18.

[6] Salvi S, Ghorpade D. What is the true burden of chronic obstructive pulmonary disease in India and what are its implications at a national level? Lung India. 2021;38(6):503-05. Doi:10.4103/lungindia.lungindia_579_21.

[7] Steer J, Gibson J, Bourke SC. The DECAF score: Predicting hospital mortality in exacerbations of chronic obstructive pulmonary disease. Thorax. 2012;67(11):970-76. Doi: 10.1136/thoraxjnl-2012-202103.

[8] Koolwal S, Sharma S, Khan K, Yadav GS. A study of modified DECAF score in predicting hospital outcomes in patients of acute exacerbation of chronic obstructive pulmonary disease at SMS Medical College, Jaipur. Adv Hum Biol. 2020;10(3):171-75.

[9] Sangwan V, Chaudhry D, Malik R. Dyspnea, eosinopenia, consolidation, acidemia and atrial fibrillation score and BAP-65 score, tools for prediction of mortality in acute exacerbations of chronic obstructive pulmonary disease: A comparative pilot study. Indian J Crit Care Med. 2017;21(10):671-77.

[10] Global Initiative for Chronic Obstructive Lung Disease (GOLD). Global strategy for the diagnosis, management, and prevention of chronic obstructive pulmonary disease. 2024 report [Internet]. Available from: https://goldcopd.org.

[11] Steer J, Norman EM, Afolabi OA, Gibson GJ, Bourke SC. Dyspnoea severity and pneumonia as predictors of in-hospital mortality and early readmission in acute exacerbations of COPD. Thorax. 2012;67(2):117-21.

[12] Roche N, Zureik M, Soussan D, Neukirch F, Perrotin D, Urgence BPCO (COPD Emergency) Scientific Committee. Predictors of outcomes in COPD exacerbation cases presenting to the emergency department. Eur Respir J. 2008;32(4):953-61.

[13] Chang CL, Sullivan GD, Karalus NC, Mills GD, McLachlan JD, Hancox RJ. et al. Predicting early mortality in acute exacerbation of chronic obstructive pulmonary disease using the CURB65 score. Respirology. 2011;16(1):146-51.

[14] Zidan MH, Rabie AK, Megahed MM, Abdel-Khaleq MY. The usefulness of the DECAF score in predicting hospital mortality in acute exacerbations of chronic obstructive pulmonary disease. Egypt J Chest Dis Tuberc. 2015;64(1):75-80. Doi:10.1016/j.ejcdt.2014.11.006.

[15] Choudhary KD, Soni G, Gupta A. A study of modified DECAF score in predicting hospital mortality in patients of acute exacerbations of COPD. Chest. 2019;155(4 Suppl):209A. Available from: https://journal.chestnet.org/article/S0012-3692(19)30389-7/fulltext.

[16] Wang Z, Li Y, Lin J, Huang J, Zhang Q, Wang F, et al. Prevalence, risk factors, and mortality of COPD in young people in the USA: Results from a population-based retrospective cohort. BMJ Open Respir Res. 2023;10(1):e001550. Doi:10.1136/bmjresp-2022-001550.

[17] Vonk JM, Jongepier H, Panhuysen CI, Schouten JP, Bleecker ER, Postma DS. Risk factors associated with the presence of irreversible airflow limitation and reduced transfer coefficient in patients with asthma after 26 years of follow-up. Thorax. 2003;58(4):322-27. Doi:10.1136/thorax.58.4.322.

[18] Zidan MH, Gharraf HS, Wahdan BE. A comparative study of DECAF score and modified DECAF score in predicting hospital mortality rates in acute exacerbation of chronic obstructive pulmonary disease. Egypt J Chest Dis Tuberc. 2020;69(3):532-41.

[19] Kumar KA, Prasanna KP, Shankar GU. A comparative study of DECAF score and modified DECAF score in predicting hospital mortality rates in acute exacerbation of chronic obstructive pulmonary disease. Int J Adv Res (Indore). 2022;10(10):839-50.

[20] Gomes L, Pereira S, Sousa-Pinto B, Rodrigues C. Performance of risk scores in patients with acute exacerbations of COPD. J Bras Pneumol. 2023;49(5):e20230032. Doi: 10.36416/1806-3756/e20230032.

PARTICULARS OF CONTRIBUTORS:

1. Postgraduate Resident, Department of Pulmonology, Jubilee Mission Medical College and Research Institute, Thrissur, Kerala, India.
2. Professor and Head, Department of Pulmonology, Jubilee Mission Medical College and Research Institute, Thrissur, Kerala, India.
3. Associate Professor, Department of Pulmonology, Jubilee Mission Medical College and Research Institute, Thrissur, Kerala, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Supriya Adiody,
Professor and Head, Department of Pulmonology, Jubilee Mission Medical College and Research Institute, Thrissur, Kerala, India.
E-mail: adiodysupriya337@gmail.com

PLAGIARISM CHECKING METHODS: [Jain H et al.]

- Plagiarism X-checker: May 03, 2025
- Manual Googling: Nov 18, 2025
- iThenticate Software: Nov 21, 2025 (1%)

ETYMOLOGY: Author Origin

EMENDATIONS: 8

AUTHOR DECLARATION:

- Financial or Other Competing Interests: None
- Was Ethics Committee Approval obtained for this study? Yes
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. NA

Date of Submission: **May 02, 2025**
Date of Peer Review: **Aug 21, 2025**
Date of Acceptance: **Nov 25, 2025**
Date of Publishing: **Jun 01, 2026**