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Original Research Article

Role of Decaf Score to Predict Hospital Mortality in Acute Exacerbation of Chronic Obstructive Pulmonary Disease

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Abstract

Background: Chronic obstructive pulmonary disease (COPD) is expected to be the third leading cause of death, according to epidemiological data. Although new therapies are improving the prognosis for these individuals, their mortality rate remains high.

Objective: we compared the AECOPD scoring system to the DECAF score in terms of diagnostic accuracy for predicting in-hospital mortality, ventilator requirements, & disease prognosis.

Methods: This Hospital based cross-sectional study was conducted on patients admitted with acute exacerbation of COPD to Department of General medicine, Andhra Medical College, Visakhapatnam. Duration of study was August 2022 to March.

Result: As per DECAF score, 41% had high risk (3-6), 15% had moderate risk (2) & 44% had low risk (0-1). Out of 44 subjects with low risk, 0% had mortality, out of 15 subjects with moderate risk, 0% had mortality at hospital, & 36.6% had mortality at 28-days in hospital mortality. There was significant difference in Mortality at Hospital & DECAF score (P < 0.0001). Patients with a DECAF score of 3.83 (or) higher have a significant risk of mortality. The mean hospital stay was more in died cases than in compared with survived cases (9.8±3.93 days vs 7.2588±3.68, p=0.0165, 95% CI: 0.4734 to 4.609). The relationship between mortality and usage of ventilator shows significant association.

Conclusion: The DECAF score is a straightforward clinical instrument for determining the in-hospital prognosis of AECOPD patients. This scoring method integrates readily available indices & can stratify patients admitted with AECOPD into clinically significant risk groups.

Keywords: DECAF Score Hospital Mortality, Acute Exacerbation, Chronic Obstructive Pulmonary Disease.

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Introduction

It is a significant global health issue, impacting approximately 300 million people & causing 3 million deaths each year. Individual total severity is influenced by exacerbations & comorbidities.

COPD is the second leading respiratory cause of hospital admissions. Secondary to pneumonia, mortality from COPD disease has increased to alarming proportions over the previous two decades.[1,2] Acute exacerbation of COPD (AECOPD) accounts for one in every eight hospital admissions and is associated with worsening symptoms, lung function, health-related quality of life, & mortality. In India, COPD ranks as the second leading cause of mortality.[3] The number of DALYs for COPD increased significantly by 36·3%.[4] Clinicians unable to predict the prognosis in patients hospitalized with AECOPD accurately.[5] Various scoring systems have been designed & used in AECOPD patients for morbidity & mortality prediction. But these scoring systems were not used routinely in clinical practice. There is no standard comparison of scoring methods to assess prognosis in AECOPD patients in an Indian population.[6]

Thus, a robust prediction tool required which can predict mortality & morbidity, & help the clinicians to identify the risk groups, & triage patients to the appropriate level of care, early escalation of level of care, identifying at admission those who can be treated in wards with non-invasive ventilation versus high-risk group requiring intensive care admission & mechanical ventilation support.[7]

Several AECOPD assessment scores were designed & studied at different centers globally. Some of these are 2008 score CAPS score, APACHE 2 score, BAP 65 score, DECAF score (Dyspnoea, Eosinopenia, Consolidation, Acidemia, Fibrillation), CAUDA70 score, 70-age NEWS score, LACE index etc. Each of these scores looked into different factors like risk assessment for recurrent admissions, 30-day readmissions, need of mechanical ventilation, hospital mortality.

DECAF score: DECAF score (Dyspnoea; Eosinopenia; Consolidation; Respiratory Acidosis; & Atrial Fibrillation:[8]

- e MRCD 5a (Too breathless to leave the house unassisted but independent in washing &/or dressing)- extended medical research council dyspnoea score;
- e MRCD 5b (Too breathless to leave the house unassisted & requires help with washing & dressing);
- Eosinopenia (eosinophils $<0.05\times10^9$/L);
- Consolidation on chest radiograph;
- Moderate or severe acidemia (pH <7.3);
- Atrial Fibrillation, including history of paroxysmal atrial fibrillation.

The DECAF score is a clinical, serological, & radiological measure that can be used to predict mortality risk in individuals experiencing an acute exacerbation of COPD.[9] The DECAF score is widely used in pulmonology to help identify high-risk patients during emergency triage.

The validation of the DECAF Score was carried out for in-hospital mortality, 28-day mortality, & ventilator requirements using AUROC.

Material and Methods

This Hospital based cross-sectional study was conducted on patients admitted with acute exacerbation of COPD to Department of General medicine, Andhra Medical College, Visakhapatnam. Duration of study was August 2022 to March 2024.

Sample size calculation: The prevalence, p was 7-50% of AECOPD cases. Sample size using the formula;

sample size (N) = Z^2*PQ/$e^{2;}$

where z = a confidence level of 95% (1.96);

p = prevalence;

q = 100-p;

“e” = allowable error (5%); N=1.96 x 1.96 x 7 x 93/5x5 N=100.03

The calculated sample size was 100.03, hence we enrolled total 100 cases with AECOPD.

Sampling Method: simple Random sampling method.

Based on this, we included 100 patients diagnosed with acute exacerbation of COPD who presented at our institute's emergency department (ED) or department of General Medicine based on inclusion and exclusion criteria.

Inclusion Criteria: Patients admitted with primary diagnosis of acute exacerbation of COPD.; Age > 35 years.; Cigarette smoking for> 10pack years.

Exclusion Criteria

- Malignancy;
- Primary reason for admission other than COPD;
- Previous inclusion in the other study.;
- Not willing to give consent the study.;

Methodology

Ethics committee approval was obtained from Institutional ethics committee and Informed consents were obtained from all the patients and/or family members of the study subjects.

All these patients with exacerbation of COPD underwent routine clinical, radiological & laboratory assessment & appropriate treatment was initiated as decided by the clinician. All the data needed for the proposed scoring systems were collected from the patients, and their records.

The collected data included demographics, history of smoking, ethanol intake, co morbid conditions, data regarding previous exacerbations, vaccination history, & assessment of state dyspnea grade at presentation based on the extended Medical Research Council Dyspnoea Score, clinical examination including assessment of conscious level & signs of severity of exacerbation (cyanosis, use of accessory inspiratory muscles, paradoxical abdominal movement), chest X-ray, ECG, ABG analysis, blood urea nitrogen (BUN), & complete blood count (CBC) were analyzed. All patients' DECAF scores for AECOPD were calculated and managed according on their condition, with prognoses of recovery and discharge or in-hospital mortality documented. At the time of admission, each patient assessed for DECAF score:

Statistical Analysis: The data was imported into Microsoft Excel, & statistical analysis performed using IBM SPSS Version 24.0. Categorical variables' data values were expressed recorded as numbers and percentages. Chi-square test was employed to determine the association between the groups. Continuous variables' data values were mentioned as mean & standard deviation. The mean difference between two groups was tested using the student's t-test. The Receiver operating characteristic (ROC) curve was used to illustrate a

sensitivity/specificity pair associated with a given decision, and the area under the ROC (AUC) curve was used to quantify how well a parameter can discriminate between two diagnostic groups. All P values of ≤ 0.05 are considered as statistically significant.

Results

The mean age of 100 patients in the research was 59.08 ± 9.69 years. The majority of subjects (40%) were 70-80 years old, while 23% were 60-70 years old, 22% were under 40 years old, & 19% were between 40 & 50 years old. Among 100 patients 92% were males & 8% were females. In the present study all males were smokers.

Variables (DECAF)	Score
Dyspnea	
eMRCD 5a (too breathless to leave the house unassisted but independent in washing and/or dressing)	1
eMRCD 5b (too breathless to leave the house unassisted and requires help with washing and dressing)	2
Eosinopenia (eosinophils <0.05×10^9/L)	1
Consolidation	1
Moderate or severe acidemia (pH <7.3)	1
Atrial fibrillation (including history of paroxysmal atrial fibrillation)	1
Maximum DECAF score =	6

The clinical outcome: a) Recovered; b) Expired (in-hospital (or) 28-day mortality); Secondary outcome: Ventilator requirement;

In the study population, 38% did not have any comorbid illness. Among total Comorbidities, the commonest comorbidity are DM+HTN in 15%, HTN in 13%, DM in 2%, Pulmonary Tuberculosis Sequalae accounts 12%, obstructive sleep apnea in 6%, coronary artery disease in 4%, CKD in 3%, connective tissue disorders in 4%, & hypersensitivity pneumonitis in 3% of patients respectively

In our study, 40% had no hypoxia, 28% had mild hypoxia, 20% had moderate hypoxia & 12% had severe hypoxia.

Among 100 patients of our study, 37% patients had Cor pulmonale as evidenced on ECHO. Out of 37 cases, 20% patients had mild pulmonary hypertension, 6% patients had moderate PHT, & 11% patients had severe PHT. Mortality observed in 72.7% of cases with Severe PHT, 40% of cases with moderate PHT, & 6.7% of cases with severe PHT, the relationship between mortality & cor pulmonale shows significant association (p<0.0001).

When dyspnea was rated using eMRC grades, 24% of patients had eMRC grade 4, 29% had eMRC grade 5a, & 47% had a score of 5b. Patients in grades 5b were more prevalent than those in grades 5d & 4 eMRC.

In our analysis of 100 cases, 10% showed eosinophilia. Consequently, 10% of the population had a reduced eosinophil level.

On an x-ray chest radiograph, 38% of patients showed consolidation. In our study, 34% of individuals developed acidemia.

According to ECHO, 14% of individuals suffered from atrial fibrillation. The remaining 86% did not exhibit fibrillation.

Table 1: DECAF Score distribution of study population

					DECAF Score Grade
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Low Risk	44	44.0	44.0	44.0
	Intermediate Risk	15	15.0	15.0	59.0
	High Risk	41	41.0	41.0	100.0
	Total	100	100.0	100.0	

Each patient was scored using the DECAF score, with dyspnea eMRC grade 5a scoring 1 point, dyspnea eMRC grade 5b scoring 2 points, & the remaining parameters, namely eosinopenia, consolidation, acidemia, & atrial fibrillation scoring 1 point.

A total of 29% of patients stayed in the hospital for less than 5 days, 47% for 5-10 days, 21% for 10-15 days, & 3% for longer than 15 days.

70 patients "improved" at the time of discharge, with "improved" clinically defined as subjective sense of improvement & objective improvement in dyspnea scoring, while 15% patients (status quo) were discharged against medical advice because their clinical condition could not be defined as 'improved' or deteriorated at the time of leaving the hospital.

There was a statistically significant relationship detected between age distribution & mortality. Age is a significant risk factor for AECOPD mortality.

Table 2: Hospital Stay distribution of study population

Hospital Stay Cat					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	< 5 Days	29	29.0	29.0	29.0
	5-10 Days	47	47.0	47.0	76.0
	10-15 Days	21	21.0	21.0	97.0
	> 15 Days	3	3.0	3.0	100.0
	Total	100	100.0	100.0	

Male patients had a lengthier hospital stay than female patients (p=0.19). 23 of 92 (25%) male patients were put on a ventilator, whereas no female patients were ventilated. There is no statistically significant gender difference in ventilator use across the study population (p=0.19).

The relationship between Cor pulmonale & outcome is statistically significant at p<0.0001.

Of the 100 patients, 23% required a ventilator, with 12 cases requiring noninvasive ventilation & 11 requiring invasive ventilation.

Patients with Cor pulmonale stayed in the hospital for an extended period of time. Patients without Cor pulmonale lasted only 5-10 days. This relationship was statistically significant (p=0.007).

The mortality rate among eMRC 5b was 31.9% (15 of 47). The correlation is statistically significant at p < 0.0001.

Table 3: Association between Use of Outcome & Dyspnea

Crosstab						
			Outcome			**Total**
			Died	**Improved**	**Status Quo**	
Dyspnea	4	Count	0	24	0	24
		% within Dyspnea	0.0%	100.0%	0.0%	100.0%
		% within Outcome	0.0%	34.3%	0.0%	24.0%
	5a	Count	0	28	1	29
		% within Dyspnea	0.0%	96.6%	3.4%	100.0%
		% within Outcome	0.0%	40.0%	6.7%	29.0%
	5b	Count	15	18	14	47
		% within Dyspnea	31.9%	38.3%	29.8%	100.0%
		% within Outcome	100.0%	25.7%	93.3%	47.0%
Total		Count	15	70	15	100
		% within Dyspnea	15.0%	70.0%	15.0%	100.0%
		% within Outcome	100.0%	100.0%	100.0%	100.0%

Pearson Chi-Square=42.70; p<0.0001

Table 4: Association between Use of Ventilator & Dyspnea

Crosstab					
			Use of Ventilator		**Total**
			No	**Yes**	
Dyspnea	4	Count	24	0	24
		% within Dyspnea	100.0%	0.0%	100.0%
		% within Use of Ventilator	31.2%	0.0%	24.0%
	5a	Count	29	0	29
		% within Dyspnea	100.0%	0.0%	100.0%
		% within Use of Ventilator	37.7%	0.0%	29.0%
	5b	Count	24	23	47
		% within Dyspnea	51.1%	48.9%	100.0%
		% within Use of Ventilator	31.2%	100.0%	47.0%
Total		Count	77	23	100
		% within Dyspnea	77.0%	23.0%	100.0%
		% within Use of Ventilator	100.0%	100.0%	100.0%

Patients admitted with AECOPD have a longer in-hospital stay as their dyspnea worsens. This association is statistically significant (p<0.0001).

There was a significant relationship between eosinopenia and outcome (p=0.003).

Table 5: Association between Outcome & Consolidation

Crosstab						
			Outcome			**Total**
			Died	**Improved**	**Status Quo**	
Consolidation	No	Count	1	58	3	62
		% within Consolidation	1.6%	93.5%	4.8%	100.0%
		% within Outcome	6.7%	82.9%	20.0%	62.0%
	Yes	Count	14	12	12	38
		% within Consolidation	36.8%	31.6%	31.6%	100.0%
		% within Outcome	93.3%	17.1%	80.0%	38.0%
Total		Count	15	70	15	100
		% within Consolidation	15.0%	70.0%	15.0%	100.0%
		% within Outcome	100.0%	100.0%	100.0%	100.0%

Consolidation is related with higher mortality rates. This association is statistically significant (p<0.0001).

Acidemia is associated with a higher in-hospital mortality rate in 86.7% (13 out of 15) patients. The relationship is statistically significant at p<0.0001.

Out of 100 patients studied, 44 had a DECAF score between 0 & 1 (low risk), 15 had a DECAF score of 2 (intermediate risk), & 41 had a DECAF score between 3-6 (high risk).

DECAF score & mortality: According to DECAF score, out of 44 subjects with Low risk, 0% had mortality, out of 15 subjects with Moderate risk, 0% had Mortality, out of 41 subjects with High-risk group, 36.6%(n=15) had Mortality at Hospital. There was significant difference in Mortality at Hospital & DECAF score (P < 0.0001).

DECAF score & Ventilation: According to DECAF score, among those with Low Risk (N=44), none of them required NIV/MV, in moderate risk group (N=15), 6.7% (N=1) required NIV, whereas in high-risk group (N=41), 53.7% (N=22) required ventilation. There was significant association between Ventilation requirement & DECAF score (p< 0.0001).

DECAF & outcome: DECAF shows it's optimum Cutoff score of 4.83 with AUC of 0.967 (95% CI:0.911 to 0.992), with Specificity, Sensitivity of 85.88% & 100% to predict the 28-day hospital mortality (p<0.0001).

In our present study, DECAF cut off value (>3) predicts the 28-day hospital mortality with AUROC of 0.929 with 85.882% of sensitivity, 100 % of Specificity, Positive Predictive Value of 100.000%, Negative Predictive Value of 55.556%, & Accuracy of 88%.

In our study, need for ventilation is 27%, DECAF shows it's optimum Cutoff score of 3.95 to predicts ventilation with AUC of 0.886 with Specificity, Sensitivity of 80% & 99% to predict the requirement of ventilation (p<0.0001).

Table 6: Association between Dyspnoea & DECAF Grade

Crosstab						
			DECAF Score Grade			**Total**
			Low Risk	**Intermediate Risk**	**High Risk**	
Dyspnea	4	Count	24	0	0	24
		% within Dyspnea	100.0%	0.0%	0.0%	100.0%
		% within DECAF Score Grade	54.5%	0.0%	0.0%	24.0%
	5a	Count	17	9	3	29
		% within Dyspnea	58.6%	31.0%	10.3%	100.0%
		% within DECAF Score Grade	38.6%	60.0%	7.3%	29.0%
	5b	Count	3	6	38	47
		% within Dyspnea	6.4%	12.8%	80.9%	100.0%
		% within DECAF Score Grade	6.8%	40.0%	92.7%	47.0%
Total		Count	44	15	41	100
		% within Dyspnea	44.0%	15.0%	41.0%	100.0%
		% within DECAF Score Grade	100.0%	100.0%	100.0%	100.0%

Table 7: Association between Age, DECAF score & hospital stay & mortality

		Age	**DECAF score**	**Hospital stay**

Survived (N=85)	Mean	58.2588	1.6941	7.2588
	SD	10.0239	1.3717	3.6844
Expired (N=15)	Mean	63.7333	4.8	9.8
	SD	5.83666	0.86189	3.93156
P value		0.0431&	< 0.0001&	0.0165&
95% CI		0.1731 to 10.7759	2.3773 to 3.8345	0.4734 to 4.6090

& Significant at p<0.05.

Discussion

We had more patients in older age groups than in younger age groups. This is consistent with the fact that age is frequently identified as a risk factor for COPD. There was no significant association between sex & mortality. This could be due to the low prevalence of smoking among females.

COPD is a male dominant disease as men were more prone for pollution as for their working atmosphere & culture that men were earners in the family & take every task outside home. In this part of the country, cooking is predominantly by using wood, this is possibly a strong risk factor for development of COPD among the female patients.

This is consistent with previous research that has identified tuberculosis as a risk factor for COPD. Tuberculosis is a potential comorbidity in COPD patients, & severe respiratory infections have been associated with impaired lung function.

There was significant association noted between hypoxia & mortality (p <0.0001).

Mortality observed in 72.7% of cases with Severe PHT, 40% of cases with moderate PHT, & 6.7% of cases with severe PHT, the relationship between mortality & cor pulmonale shows significant associaton (p<0.0001).

This finding is consistent with other research that have indicated prevalence ranging from 20% to 91%.[33,34] depending on the definition of pulmonary hypertension, the

degree of lung illness in the study group, & the method used to measure PAP.

All patients were rated using the extended Medical Research Council score (eMRC). When dyspnea was rated using eMRC grades, 24% of patients had eMRC grade 4, 29% had eMRC grade 5a, & 47% had a score of 5b. Patients in grades 5b were more prevalent than those in grades 5d & 4 eMRC. In patients with grade 5b, mortality was 100% (N=15), but there were no cases with grade 5a or grade 4 (p<0.0001).

Because the patients were admitted with an acute exacerbation of COPD, the majority of them reported dyspnea at rest, grade-5, which was further classified as 5a & 5b based on functional dependency. Patients with grade-4 dyspnea, while having no dyspnea at rest, were admitted for AECOPD due to increased sputum quantity & purulency.

In our study population, eosinopenia is less common than in the western literature. Previous investigations have indicated that eosinopenia is associated with the response to acute infection & inflammation.[10] Hence, in AECOPD, eosinopenia may represent severity of the associated acute inflammatory response.

Steer et al[12] reported a similar incidence of 32.5% consolidation in patients with AECOPD in their 920-patient sample. In two further studies[11,12], consolidation was found in 16% of all hospitalizations & 34% of patients requiring breathing assistance. AECOPD is frequently caused by an infectious agent, such as a viral or bacterial infection.[11,12]

Presence of Acidemia: Acidemia is described as having an arterial blood gas pH below 7.30. In our study, 34% of individuals developed acidemia.

This is consistent with other research, which have indicated a prevalence ranging from 25% to 53%.[8]

According to ECHO, 14% of individuals suffered from atrial fibrillation. The remaining 86% did not exhibit fibrillation.

This incidence is lower than in previous research, which have shown an occurrence of more than 12%.38 Acidemia, medications, & cor pulmonale all contribute to arrhythmias in COPD patients.

The DECAF score: Each patient was scored using the DECAF score, with dyspnea eMRC grade 5a scoring 1 point, dyspnea eMRC grade 5b scoring 2 points, & the remaining parameters, namely eosinopenia, consolidation, acidemia, & atrial fibrillation scoring 1 point.

Current study devided the population into three groups based on DECAF scores of 0-1, 2, & 3-6.

44% of patients had a DECAF score ranging from 0 to 1, 15% had a DECAF score of 2, & 41% had a DECAF score of 3 to 6. In a study of 15 patients, 36.6% died with a DECAF score of 3-6, while 29.3% survived with a DECAF score of 2 (p < 0.0001).

Duration of hospital stay: The hospital stay was separated into four groups: <5 days, 5-10 days, 10-15 days, & >15 days. A total of 29% of patients stayed in the hospital for less than 5 days, 47% for 5-10 days, 21% for 10-15 days, & 3% for longer than 15 days. Patients who died had a longer average hospital stay than those who survived (9.8±3.93 days vs 7.2588±3.68, p=0.0165, 95% CI: 0.4734 to 4.609).

In a research by Ying et al, 590 patients treated with AECOPD had a median hospital stay of 6 days. Various studies have shown that hospital stays can last anywhere from 3 to 11 days.

Outcome: The mortality rate in our study population was 15% per 100 cases. 70 patients "improved" at the time of discharge, with "improved" clinically defined as subjective sense of improvement & objective improvement in dyspnea scoring, while 15% patients (status quo) were discharged against medical advice because their clinical condition could not be defined as 'improved' or deteriorated at the time of leaving the hospital.

This study supports the conclusions of prior investigations. Karin H Groenewegen et al. found that in a study of 171 patients admitted with AECOPD, the mortality rate was 8% during the hospital stay & increased to 23% after a year of follow up.[13]

Use of ventilator: Of the 100 patients, 23% required a ventilator, with 12 cases requiring noninvasive ventilation & 11 requiring invasive ventilation.

Ventilated patients had a higher mortality rate than non-ventilated patients (6.7% vs. 93.3%, p<0.0001). The relationship between mortality & usage of ventilator shows significant association.

This is consistent with other studies that have indicated ventilator use between 8 & 12% in patients being hospitalized with AECOPD.[13,14]

There is a significant relationship between age & outcome (p=0.04). Patients who were older age died at a higher rate.

The percentage of patients placed on a ventilator in the age ranges 40-50, 50-60, & 60-70 is 13.0%, 13.0%, 56.5%, & 17.4%, respectively. The use of ventilators rises with aging.

Sex & Outcome: The mortality rate among female patients was 0%. The mortality rate for male patients is 15 out of 100 (15%). There is no statistically significant relationship between gender & mortality (p=0.05).

Patients with Cor pulmonale & pulmonary hypertension had higher mortality rate than the general population. The relationship between Cor pulmonale & outcome is statistically significant at p<0.0001. 22 of 37 patients (59.45%) with cor pulmonale required ventilator assistance.

Patients with Cor pulmonale stayed in the hospital for an extended period of time. Patients without Cor pulmonale lasted only 5-10 days. This relationship was statistically significant (p=0.007). This finding is consistent with previous research[15,16], which has shown that Cor pulmonale is an adverse prognostic feature in AECOPD.

Patients with Cor pulmonale had a longer average hospital stay compared to those without (9.162±3.996 vs 6.746±3.4265, p<0.0001).

The DECAF score was higher in patients with Cor pulmonale than in patients without Cor pulmonale (3.9729 ± 1.0404 vs 1.095± 0.979, p<0.0001).

eMRC dyspnea & Outcome: The correlation is statistically significant at p< 0.0001.

Patients admitted with AECOPD have a longer in-hospital stay as their dyspnea worsens. This association is statistically significant (p<0.0001).

Steer et al reported an in-hospital mortality rate of 33.1% for eMRCD 5b patients. The current study's findings are consistent with earlier studies1921, which have shown that the severity of dyspnea is highly related with both in-hospital mortality & early readmission.

Combining the MRCD scale with a person's ability to handle personal care (eMRCD) improves the predictive value of dyspnea rating.

Eosinopenia & Outcome: There was a significant relationship between eosinopenia and outcome (p=0.003). The findings are consistent with recent studies by Holland et al.[17] & J Steer et al, who found eosinopenia to be a significant predictive factor in AECOPD.

Consolidation is related with higher mortality rates. This association is statistically significant (p<0.0001).

Acidemia is associated with a higher in-hospital mortality rate in 86.7% (13 out of 15) patients. The relationship is statistically significant at p<0.0001.

According to earlier studies 42,43, the frequency of hypercapnic respiratory failure in AECOPD patients ranges from 16-35%, with an overall mortality rate of 35-43%. Hypercapnia, which indicates chronic alveolar hypoventilation, represents the severity of the underlying respiratory disease.

Atrial fibrillation is related with a higher mortality rate. This is consistent with research conducted by J Steer et al, which found that 26% of patients who died in the hospital had atrial fibrillation. Previous

research has found that having atrial fibrillation is associated with a bad prognosis.

Longer in-hospital stays were not associated with a better outcome. There was no significant correlation between length of hospital stay & outcome.

The mortality rates for ventilated & non-ventilated patients were 60.9% & 1.3%, respectively. There was a higher mortality rate among ventilated individuals. The association between ventilator use and outcome is statistically significant ($p < 0.0001$). The mean hospital stay for both ventilated & non-ventilated patients is 10.043±4.343 days & 6.922±3.34729 days.

The mean DECAF score for both ventilated & non-ventilated patients is 4.304 ± 1.0632 & 1.5194 ± 1.3039, respectively, $p < 0.0001$.

Patients using ventilators had significantly longer hospital stays compared to non-ventilated patients ($p < 0.001$).

Out of 100 patients studied, 44 had a DECAF score between 0 & 1 (low risk), 15 had a DECAF score of 2 (intermediate risk), & 41 had a DECAF score between 3-6 (high risk).

This is consistent with the findings of J. Steer et al, who found that the low risk group represented 53.5% of the study population, the intermediate risk group comprised 24.5%, & the high risk group comprised 22% of the study population.

There is no mortality in patients with a DECAF score of 0–2.

Patients with a score of ≥ 3 had a mortality rate of 15/41. In terms of percentage, this is 36.6%. The higher the DECAF score, the higher the mortality rate. The correlation is statistically significant at $p<0.0001$.

Our work is consistent with the findings of J Steer et al. In their analysis of 920 AECOPD patients, the strongest five categorical variables statistically associated with in-hospital mortality were identified, & the DECAF score was developed. The higher the DECAF score, the longer the hospital stay. The correlation between DECAF score & in-hospital stay is statistically significant ($p=0.01$).

The low, moderate, and high-risk groups have 24, 10, & 10% of patients under 60 yrs old, respectively. The low, intermediate, and high-risk groups each have 20%, 5%, and 31% of patients over the age of 60 yrs. A strong relationship exists between age & DECAF score ($p=0.004$). The number of female patients in the low, moderate, & high-risk groups is 5, 2, & 1. Male patients account for 39%, 13%, & 40% of all patients in the low, intermediate, & high-risk groups, respectively.

In patients with dyspnea grade-5b the number of patients in low, intermediate & high-risk groups are 3, 6 & 38 ($p<0.0001$).

Patients with a dyspnea grade of 4 or 5a had a better outcome than patients with a grade 5b. Patients with a higher grade of dyspnea on eMRC had a higher DECAF score. The association is statistically significant, $p=0.000$.

The proportion of cor pulmonale patients in low, moderate, and high-risk groups is 4%, 2%, & 16%, respectively. Patients without cor pulmonale are divided into low, moderate, & high-risk groups, with 40%, 13%, & 15%, respectively. Patients with cor pulmonale had higher DECAF scores. Patients without pulmonary hypertension had a score of 0 to 2 with a good prognosis.

As the e MRC dyspnea grade increases in patients admitted with AECOPD, so does their mortality rate. Almost every patient with a score of 4 improved. Mortality is more common in eMRC-5a & 5b, and as the severity of dyspnea increases, ventilator support is used more frequently. This association is statistically significant in a study conducted by Steer et al., who observed that the severity of dyspnea is highly associated with mortality & early readmission.

In study conducted by Steer et al DECAF score shows excellent discrimination for mortality with AUROC OF 0.89.

In our study AUROC of DECAF score for mortality is 0.86.

In a study by Yousif et al they compared DECAF Score, BAP65 score & 2008 score, they found significant statistical association between mortality & age, Smoking & gender.[18]

Echevarria et al found significant relationship between mortality & DECAF score even our study proved the same.[19]

Conclusion

The higher the DECAF score, the higher the mortality, the longer the hospital stay, & the higher the requirement for a ventilator. The presence of cor pulmonale can be used as a surrogate marker for a high DECAF score.

The DECAF score is a straightforward clinical instrument for determining the in-hospital prognosis of AECOPD patients. This scoring method integrates readily available indices & can stratify patients admitted with AECOPD into clinically significant risk groups.

Hence, by analyzing the DECAF score at the time of admission to AECOPD aids in decision making regarding;

1. Early escalation of care;

2. Deciding the location of treatment – ICU or ward;
3. Determining the requirement of ventilator;
4. Deciding management strategy;
5. Helps physician to inform status of the patient to the relatives about prognosis.

DECAF score can be utilized in both OPD and emergency settings, & it has demonstrated good accuracy in predicting hospital mortality, 30-day readmission, & the need for mechanical ventilation.

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