



## A STUDY ON THE PREDICTORS OF MORTALITY IN ACUTE EXACERBATIONS OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE USING DYSPNEA, EOSINOPENIA, CONSOLIDATION, ACIDEMIA AND ATRIAL FIBRILLATION SCORE (DECAF) IN A TERTIARY CENTRE.

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### ABSTRACT

**Introduction** Chronic Obstructive Pulmonary Disease (COPD) has emerged as one of the primary causes of death globally with 90% of fatalities occurring in low- and middle-income countries. It is an enormous economic and social burden, with high morbidity and mortality. The DECAF score, a simple tool regularly employed by clinicians, is a predictive measure for in-hospital mortality and can be conveniently applied at the bedside for risk stratification during Acute Exacerbations of COPD (AECOPD). **Material And Methods:** A cross-sectional observational study was conducted involving 100 patients, aged between 40 and 82 years, with a mean age of 60, who presented to the OP and IP of the Department of Respiratory Medicine. Participants who met the inclusion criteria with a diagnosis of COPD were evaluated and their data was collected. Subsequently, a DECAF score was assigned to each patient. The study then observed in-hospital mortality and conducted a comparative analysis of the characteristics between survivors and non-survivors. **Results:** The study included 100 confirmed cases of COPD, ranging from 40 to 82 years old, with a mean age of 60.66 years. A male predominance was noted, as there were 77 males and 23 females in the study. An increase in the DECAF score corresponded to a higher utilization of ventilation. In the low-risk group (DECAF 0-1), only one patient required mechanical ventilation, while in the intermediate-risk group, 1 (6.25%) patient and in the high-risk group, 14 (87.5%) patients required mechanical ventilation. **Conclusion:** In patients admitted with acute exacerbation of COPD, the DECAF score is a beneficial clinical tool for in-hospital prognosis. Assessing the DECAF score after admission due to AECOPD aids in decisions regarding early escalation of care, therapeutic interventions, evaluating the necessity for ICU admissions, determination of the need for assisted ventilation, decision-making in end-of-life care, and provides valuable information to clinicians for informing patients and relatives about life-threatening risks associated with exacerbation.

### KEYWORDS : COPD, DECAF

#### INTRODUCTION:

Chronic Obstructive Pulmonary Disease (COPD) is a heterogeneous disease characterized by persistent airflow limitation which is not fully reversible. It's associated with chronic respiratory symptoms due to the involvement of airways and or alveoli. DECAF score is a simple tool practised routinely by clinicians that predicts in-hospital mortality and can be applied at the bedside for risk stratification of AECOPD. This score has not been validated sufficiently in the Indian population, so we decided to evaluate the application of the DECAF score in the prognostication of patients hospitalized with acute exacerbation of the chronic obstructive pulmonary disease, to decide the early escalation of therapeutic interventions and more optimal use of available resources, especially in poor socio-economic & developing countries

#### MATERIALS AND METHODS

A cross-sectional observational study was conducted on 100 patients aged 40 to 82 with a mean age of 60 who attended the respiratory medicine OPD and IPD were evaluated. Patients admitted with the clinical diagnosis of acute exacerbation of COPD, satisfying our inclusion and exclusion criteria during the study period were included. Participants' socio-demographic and clinical data were collected.

Breathlessness was graded according to the Extended Medical Research Council (MRC) dyspnea (eMRC) Score. Details of comorbidity were obtained either from the history or clinical records. Complete blood count, absolute eosinophil count and arterial blood gas results were recorded on admission along with other routine biochemistry tests. A chest radiograph was assessed to look for new consolidation. ECG was done to look for atrial fibrillation. The frequency of admissions for AECOPD during last year was also noted to calculate the Modified DECAF score. The participants were followed up during the hospital admission. The investigator did not interfere with the treatment. An ethical clearance was obtained from the institutional ethical committee.

#### Statistics

Statistical analysis was done using SPSS version 2.0. Categorical variables were analyzed using the Pearson chi-square test and the ANOVA test was used for quantitative variables. The significance of correlation between variables was assessed using a p-value and those with  $p < .05$  were considered statistically significant.

#### RESULTS:

The study was conducted among 100 confirmed cases of COPD in the age group of 40 to 82 years with a mean age of

60.66 years. There was a male predominance in the study with 77 being males and 23 females. Among the study subjects, 43 patients had other comorbid illness; the most common being sequelae of pulmonary tuberculosis (n=18), whereas 8 patients had hypertension, 4 had coronary artery disease, 2 had connective tissue disorder, 2 patients had chronic kidney disease, 1 patient had carcinoma of the liver, 3 patients had diabetes mellitus and 2 patients had active tuberculosis.

DECAF score was assessed among the participants and is summarized in Table 1. 49 patients had a DECAF score between 0-1, 17 patients had a DECAF score of 2 and 34 patients had a DECAF score between 3-6.

**Table no-1 DECAF score**

DECAF SCORE PARAMETER	FREQUENCY
DYSPNEA GRADE (MRC)	≤4
	5a
	5b
EOSINOPENIA	YES
	NO
CONSOLIDATION	YES
	NO
ACIDEMIA	YES
	NO
ATRIAL FIBRILLATION	YES
	NO

Modified DECAF score was assessed in all these patients in the frequency of hospitalization in the last year was also looked for. The average duration of hospital stay for the study group was 6.90 days.

39 patients had hospital stays less than 5 days, 42 patients had hospital stays between 5-10 days, 16 patients had hospital stays between 11-15 days, and 3 patients stayed in hospital longer than 15 days. The modified DECAF scoring has been summarized in Table 2.

**Table no -2 modified DECAF score**

MODIFIED DECAF SCORE	RISK CATEGORY	NO. OF PATIENTS
0-1	LOW	50
2	INTERMEDIATE	16
3-6	HIGH	34
TOTAL		100

Individual components of the DECAF scoring system were correlated with the outcome to look for the association. It was found that dyspnoea, consolidation, acidemia, atrial fibrillation and frequency of admission were associated with the outcome as summarised in Table no 3

**Table No 3 – Modified Decaf Score**

	OUTCOME			TOTAL	χ <sup>2</sup> (P-VALUE)
	IMPROVED	DEATH	UNDEFINED		
EOSINOPENIA	11	2	0	13	0.7161 (0.6678)
	72	11	4	87	
CONSOLIDATION	15	12	3	30	33.513 (0.0001)
	68	1	1	70	
ACIDEMIA	13	13	1	27	40.569 (0.0001)
	70	0	3	73	
ATRIAL FIBRILLATION	3	4	0	7	13.045 (0.0015)
	80	9	4	93	

FREQUENCY OF ADMISSION	75	2	2	79	58.725 (0.0001)
0-1	6	12	3	21	
≥2					
DYSPNEA GRADE	36	0	0	35	28.774 (0.0001)
≤4					
5a	25	0	1	26	
5b	22	13	3	38	

As the DECAF score increases, the use of ventilation was found to increase. In the low-risk group (DECAF 0-1) only 1 patient was mechanically ventilated whereas, in the intermediate-risk group 1(6.25%) patients and in the high-risk group 14(87.5%) patients were mechanically ventilated. By chi-square test, a statistically significant association was found between the DECAF score and outcome, P=0.0001.

The study participants' DECAF and modified DECAF scores were analysed to look for their association with the outcome. It was found that the higher the DECAF score, the higher the mortality. This relation was statistically significant at p = 0.000021. The mean DECAF score in improved patients was found to be 1.32, while it was as high as 4.38 in patients who died. The findings have been summarised in Table 4

**Table No 4 Modified Decaf Outcome**

	OUTCOME			TOTAL	χ <sup>2</sup> (p)
	IMPROVED	DEATH	UNDEFINED		
MODIFIED DECAF SCORE	50	0	0	50	25.456 (0.000041)
0-1					
2	15	0	1	16	
3-6	18	13	3	34	26.8322 (0.0002)
DECAF SCORE	49	0	0	49	
0-1					
2	16	0	1	17	
3-6	18	13	3	34	

**DISCUSSION**

Recent evidence supports the characterization of Chronic Obstructive Pulmonary Disease (COPD) as a systemic rather than solely pulmonary ailment, challenging earlier perceptions. For individuals admitted with Acute Exacerbation of COPD (AECOPD), the DECAF score emerges as a straightforward prognostic tool. Integrating clinical and routine laboratory data upon admission effectively predicts in-hospital mortality. The DECAF score excels in stratifying patients into meaningful risk categories and demonstrates superior performance compared to other proposed prognostic scores.

Among the 100 participants in our study, the average age was 60.66 years, with a distribution of 77% males and 23% females. Notably, there is a higher representation of patients in the older age group, and males predominate. These findings align with a study conducted by Slenker et al [1], where the average age was 70.5 years, and 50.0% of 130 patients were male, reinforcing the association between COPD and advancing age, recognized as a significant risk factor.

The observed lower prevalence of COPD among females may be linked to a lesser prevalence of smoking habits in this demographic. Factors such as passive smoking, biomass exposure, and post-tuberculosis incidents could contribute to COPD development in females.

In our study, the most prevalent comorbid condition among

participants is pulmonary tuberculosis sequelae, consistent with the understanding that tuberculosis serves as a risk factor for COPD [4].

The extent of dyspnea serves as an indicator of the patient's perception of illness and can be quantified on a scale. When dyspnea was classified based on eMRCd grades in our study, 36% of patients had eMRCd grade 4 or lower, 26% had grade 5a, and 38% had grade 5b. In a study by J Steer et al [29], 54.9% of patients had dyspnea grade 5a, and 45.1% had grade 5b. Similarly, in a study of 50 patients with AECOPD by Prabhhu et al [2], the percentages for dyspnea grade 5a were 42%, and for grade 5b, it was 34%. Due to the subjective nature of dyspnea, minor variations in grading may be observed.

In our study, 13% of patients exhibited eosinopenia, while V. Sangwan et al [3] found eosinopenia in 24% of AECOPD patients. The higher prevalence of eosinopenia in a significant proportion of cases might be linked to concurrent secondary bacterial infections, as documented by Gil H et al [4] in their research.

### CONCLUSION:

The DECAF score is a simple clinical tool for assessing in-hospital prognosis in patients admitted with acute exacerbation of chronic obstructive pulmonary disease. Hence assessing the DECAF score at the time of admission in AECOPD helps in decisions regarding early escalation of care and therapeutic interventions, the need for ICU admissions, determining the need for use of assisted ventilation, deciding the end-of-life care and helps the clinicians in informing the patient and relatives regarding the prognosis of life-threatening risks related to exacerbation.

The modified DECAF scoring system has thrown light on the adequate control of disease as frequent exacerbators with more hospitalization had higher mortality rates

### Limitations:

DECAF score derivation and validation was multicentral and on a larger population, whereas our study data is confined to a limited number of patients from a single center

This score from the Western literature may not be truly replicable in Indian settings

For diagnosing consolidation imaging, studies such as USG and CT scans may be a better modality.

**Conflict Of Interest - NONE**

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### REFERENCES:

1. Slenter R, H, J, Sprooten R, T, M, Kotz D, Wesseling G, Wouters E, F, M, Rohde G, G, U: Predictors of 1-Year Mortality at Hospital Admission for Acute Exacerbations of Chronic Obstructive Pulmonary Disease. *Respiration* 2013;85:15-26. doi: 10.1159/000342036
2. Dr.Prabhhu P, Dr.Bharath K and Dr.Brinda B. The Decaf score: prognostication scoring system for Patients Presents with Acute exacerbation of chronic obstructive pulmonary disease to Emergency Medicine department of tertiary Care Hospital. *International Journal of Applied Research*. 2019; 5(11): 212-221.
3. Sangwan V, Chaudhry D, Malik R. Dyspnea, eosinopenia, consolidation, acidemia and atrial fibrillation score and BAP-65 score, tools for the prediction of mortality in acute exacerbations of chronic obstructive pulmonary disease: A comparative pilot study. *Indian J Crit Care Med* 2017;21:671-7
4. Gil H, Magy N, Mauny F et al. Value of eosinopenia in inflammatory disorders: an 'old' marker revisited. *Rev. Med. Interne*. 2003; 24: 431-5 (in French).
5. Steer J, Norman EM, Afolabi OA, et al Dyspnea severity and pneumonia as predictors of in-hospital mortality and early readmission in acute exacerbations of COPD *Thorax* 2012;67:117-121.
6. C. Terzano, S. Romani, V. Conti, G. Paone, F. Oriolo, A. Vitarelli, Atrial fibrillation in the acute, hypercapnic exacerbations of COPD, *Eur Rev Med PharmacolSci*, Year: 2014, Vol. 18 - N. 19 Pages: 2908-2917
7. Connors AF, Dawson NV, Thomas C, et al. Outcomes following acute exacerbation of severe chronic obstructive lung disease. The SUPPORT investigators (Study to Understand Prognoses and Preferences for Outcomes

- and Risks of Treatments). *Am J Respir Crit Care Med*. 1996;154
8. Shorr AF, Sun X, Johannes RS, Yaitanes A, Tabak YP Validation of a novel risk score for severity of illness in acute exacerbations of COPD. *Chest* 2011;140:1177-83.
9. Mohamed H. Zidan a,1, Abdelmonem K. Rabie a,2, Mohamed M. Megahed b,3, Mahmoud Y. Abdel-Khaleq c,\* The usefulness of the DECAF score in predicting hospital mortality in Acute Exacerbations of Chronic Obstructive Pulmonary Disease; *Egyptian J. Journal of Chest Diseases and Tuberculosis* (2015) 64, 75-80.
10. Prakash, D. S., Jain, D. S., Singh, D. L., &Tandon, D. R. (2019). a study of modified decaf score in predicting hospital mortality in patients of acute exacerbations of chronic obstructive pulmonary disease. *International Journal of Medical and Biomedical Studies*, 3(9).<https://doi.org/10.32553/ijmbs.v3i9.541>