ORIGINAL ARTICLE

Decaf Score in Predicting Prognosis of Acute Exacerbation of Copd in Patient Required Hospital and ICU Admission

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ABSTRACT

Introduction: Exacerbation refers to deterioration of patient's respiratory indications and requires a robust scoring tool for subjects suffering from Chronic Obstructive Pulmonary Disease (COPD) undergoing acute exacerbation. The Dyspnoea, Eosinopenia, Consolidation, Acidaemia, and atrial Fibrillation (DECAF) score can be utilized bedside and predicts in-hospital mortality using indices. The study aimed at assessing the prognostic standards (of duration of ICU stay, hospital stay and mortality) and the sensitivity and specificity of acute exacerbation of COPD patients based on DECAF score. **Methods:** This prospective study was carried out in a tertiary hospital with 84 patients between October 2016 to September 2018. On admission, DECAF score of all patients with acute exacerbation of COPD was noted and admitted to ICU. The mean duration of stay in ICU and hospital were compared. Various components of APACHE II, BAP 65, CURB 65 were also noted on admission. **Results:** Mean age of population was 68.29±11.80 with male predominance (68%). The study observed mortality in 6% of patients with mean ICU stay of 3.65±2.21 days and mean hospital stay of 6.45±3.28 days. For a score of 5 and 6 mean DECAF score could not be calculated as the mortality rate was 100%. ROC of DECAF score was 0.81 which was more than APACHE II (0.72) and BAP 65 (0.69) (p-value 0.07 and 0.056 suggested significance). **Conclusion:** The DECAF Score has been observed to be a stronger predictor for hospital mortality. Higher the DECAF score, higher is the in-hospital death rate. The DECAF score also helps in forecasting the duration of ICU stay and hospital stay.
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Keywords: Acute exacerbation, APACHE II, BAP 65, CURB 65, DECAF score

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INTRODUCTION

Exacerbation in patients with Chronic Obstructive Pulmonary Disease (COPD) has been defined by the deterioration of patient's respiratory indications beyond the person's regular daily differences, leading to changes in treatment (1). In patients presenting with hypercapnic exacerbations, the rate of in-hospital death rate is around 10% (2). If mechanical support is used during hospitalisation the death rate reaches 40% at one year after discharge and reaches 49% three years after discharge (3,4).
Well established scores exist to assess mortality risk in stable COPD (5). However, these prognostic tools have not been studied on patients requiring hospitalisation. An easy prognostication tool–the Dyspnoea, Eosinopenia, Consolidation, Acidaemia, and atrial Fibrillation (DECAF) score was developed for aiding in effective resource management thereby resulting in reduction mortality and morbidity (6).

Thus, the study aimed to assess the prognostic value and the sensitivity and specificity of acute exacerbation of COPD patients based on DECAF score.

MATERIALS AND METHODS

This prospective observational study was carried out on patients admitted at Ramaiah Hospitals, Bangalore, from September 2016 to August 2018. Ethical clearance was obtained from the institutional ethical committee board. Informed consent was obtained from all patients.

All those who were previously diagnosed COPD by pulmonary function test, now presenting with exacerbation were a part of the present study. Patients with overt malignancy, known asthmatic, valvular and ischemic heart diseases, hyperthyroidism and hypertension were excluded from the study.

In the present study sample size is calculated considering studies done by Nafae et al. and Echevarria et al where the specificity of predicting mortality of DECAF was 88%. In the present study, expecting similar results with DECAF score and to get precision of 95% confidence interval with 2% absolute precision, this study requires

minimum of 84 subjects.

Sample size (n) on the basis of specificity =

$$\frac{Z^2_{1-\alpha/2} \times S_P \times (1 - S_P)}{L^2 \times (1 - prevalence)}$$

$Z^2_{1-\alpha/2}$ = standard normal deviate which corresponds to the specified critical region site (α); Sp: Anticipated specificity; 1-α: Confidence interval; L: Absolute precision desired on either half (half-width of confidence interval) of sensitivity or specificity

RESULTS

In the present study, out of 84 patients, 5 deaths occurred. For the remaining 79 cases the mean stay in ICU (from DECAF score of 0 to 4 were 1.66±0.57 vs 2.21±1.04 vs 2.97±1.58 vs 4.92±2.1 vs 6.2±1.64 days and hospital stay (from DECAF score of 0 to 4 were 3.3±1.15 vs 4.82±2.46 vs 5.45±2.78 vs 8.34±2.54 vs 11.5±1.64 days). For a DECAF score of 5 and 6 mean duration of stay could not be calculated as the mortality rate was 100% (Table I).

Table I: Comparison of DECAF score with mean duration of ICU and hospital stay (in days)

Decaf Score	Number Of Patients	Mean Duration In ICU (Days)	Mean Duration In Hospital (Days)	Deaths
0	3	1.66 ± 0.57	3.3 ± 1.15	0
1	23	2.24 ± 1.04	4.82 ± 2.46	0
2	20	2.97 ± 1.58	5.45 ± 2.78	0
3	28	4.92 ± 2.1	8.34 ± 2.54	0
4	6	6.2 ± 1.64	11.5 ± 1.64	1
5	3	-	-	3
6	1	-	-	1
OVERALL	84	3.65±2.21	6.45±3.28	

DECAF-Dyspnoea, Eosinopenia, Consolidation, Acidaemia, and atrial Fibrillation; ICU- Intensive Care Unit

Using chi square test, groups of individuals were compared. With the increase in DECAF score, the duration of hospital stay also extended , which was statistically significant (Table II).

Comparative analysis of ROC of DECAF score was performed with other known scoring systems for acute exacerbation of COPD. It was superior to ROC of APACHE II (0.72), BAP 65 (0.69), CURB 65 (0.71) (Figure 1).
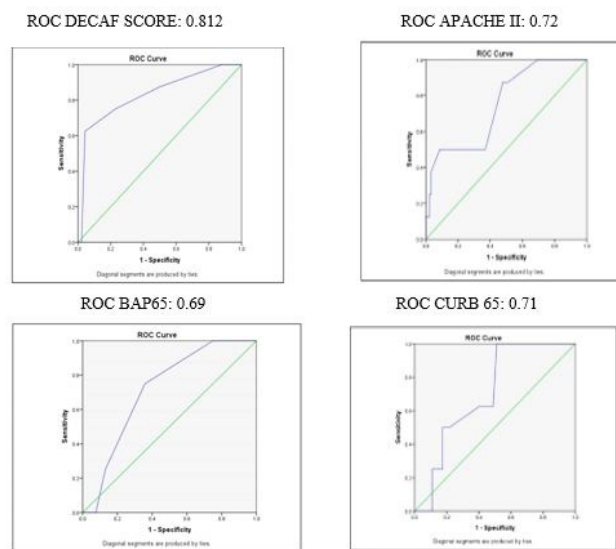
Figure 1: Different ROCs for various COPD scoring systems

DISCUSSION

Acute exacerbations of COPD (AECOPD) account for one in eight hospital admissions. A powerful prognosis tool aiding in patient stratification based upon their seriousness may help in the form of management, including Hospital stay or early supported discharge in case of low-risk patients , and early escalation for high-risk groups (7). The DECAF Score is a promising tool for the stratification of risk in patients hospitalised with AECOPD.

The present study includes 84 patients admitted in ICU with Acute exacerbation of COPD and the usefulness of DECAF score were analysed based on duration of stay in ICU and hospital. We have compared DECAF score with other prognostic scores (APACHE II, CURB 65 and BAP 65).

Table II: DECAF score and average duration of ICU and hospital stay (days)

	DECAF					Total (n=84)	P value
	0 (n=3)	1 (n=23)	2 (n=20)	3 (n=28)	4 or more (n=10)		
Total Hospital Stay							
1-6	2(66.7%)	18(78.3%)	16(80%)	9(32.1%)	3(30%)	48(57.1%)	
7-14	1(33.3%)	5(21.7%)	3(15%)	19(67.9%)	6(60%)	34(40.5%)	<0.01
>14	0(0%)	0(0%)	1(5%)	0(0%)	0(0%)	1(1.2%)	
D	0(0%)	0(0%)	0(0%)	0(0%)	1(10%)	1(1.2%)	
ICU Stay							
1-6	3(100%)	23(100%)	19(95%)	21(75%)	2(20%)	68(81%)	
7-14	0(0%)	0(0%)	1(5%)	7(25%)	3(30%)	11(13.1%)	<0.01
>14	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	
D	0(0%)	0(0%)	0(0%)	0(0%)	5(50%)	5(6%)	

DECAF-Dyspnoea, Eosinopenia, Consolidation, Acidaemia, and atrial Fibrillation; ICU- Intensive Care Unit

In the present study, most of the patients aged between 61-70 years (35.7%). Mean age of population was 68.29±11.80. The mortality rate was 6% (5/84), which is consistent with the published figures of mortality of 4.4-7.7 % (7). A previous study done on total 78 patients showed the average Length of stay in hospital was 15.1 days. The duration of hospital stay was lowest for patients with scores 0-1 (12 days) and highest with DECAF scores 3-5 (16.7 days). The findings in the present study for DECAF 0-1 vs 3-4 was 4.7 days vs 8.7 days (8).

The mean hospital stay duration (days) in Echeverria et al. study for DECAF score 0-4 was 3, 4, 5, 7 and 7.5 days whereas, Kumar et al. observed 0, 3, 6, 10 and 15 days, respectively. Similar parameter in the present study showed, 3.3, 4.8, 5.45, 8.34 and 11.5 days, respectively. A multicentric study done by Echeverria et al. showed similar results and established DECAF score to have a better ROC for predicting in-hospital mortality as compared to the APACHE II prognostic index (ROC=0.78, DECAF vs. APACHE II, p=0.003) in addition to being more powerful in predicting in-hospital deaths as compared to CURB-65 considering a patient subgroup having radiological consolidation (ROC = 0.87 vs. 0.65, p=0.02) (7).

An analysis reported by Nafae et al. performed on 200 AECOPD patients confirmed the DECAF score to be an excellent differentiation in in-hospital mortality (ROC=0.83), which was superior to APACHE II and CURB 65 (ROC: 0.68 and 0.65) (9). The ROC of DECAF, APACHE II, BAP-65 and CURB-65 was 0.82, 0.78, 0.77 and 0.76 in the study conducted by Echevvaria et al. 0.83, 0.68, 0, and 0.65 in Nafae et al. study and 0.81, 0.72, 0.69 and 0.71 in the present study, respectively (7,9). A pilot study done in India compared sensitivity and specificity between DECAF and BAP 65, in which the DECAF score had a sensitivity and specificity of 80% each, whereas BAP 65 was sensitive (100%), but had a specificity of 80% (10).

All the non survivors in our study belonged to DECAF group at a higher risk (DECAF score of 3 to 6), which were similar to study conducted by Kumar et al. where in all the non survivors (6 out of 80) belonged to DECAF score of 3-6 (11). Patients with DECAF score of 5 and 6 were five and mortality was seen in all five patients. All five patients had consolidation requiring broad spectrum antibiotics and type two respiratory failure requiring ventilatory support (initially non-invasive and later invasive ventilations). All five patients had atrial fibrillation due to hypoxia and respiratory acidosis. Four of the five patients had eosinopenia. So patients with higher the DECAF score are at high risk for mortality.

Findings from present study can suggest patients hospitalized with AECOPD can be categorized into low risk (DECAF 0–1) of in hospital mortality and might therefore potentially be worthy for early supported discharge. On the other hand, a high risk (DECAF Score ≥3) might be used as a guide to early escalation of care.

CONCLUSION

The DECAF Score has been reported to be a strong prediction tool for hospital mortality. Higher the DECAF score, higher is the probability of in-hospital death . The DECAF score also helps in predicting the duration of ICU stay and hospital stay.

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