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# PREDICTION OF OUTCOMES IN ACUTE EXACERBATION OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD) WITH DECAF SCORE AND BAP 65 SCORE

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**ABSTRACT** **Background:** Prognostic research in exacerbations of chronic obstructive pulmonary disease (COPD) requiring hospitalization has been limited and there appears to be little common ground between predictors of mortality in stable disease and during COPD. Furthermore, none of the prognostic tools developed in stable disease have been tested on hospitalised patients so this study was planned. **Objectives:** To test dyspnoea, eosinopenia, consolidation, acidaemia, and atrial fibrillation (DECAF) and biological assessment profile (BAP) 65 scores on patients in a tertiary care set up and validate the same. **Methods:** Hospital based prospective observational study was carried out in 80 patients with COPD who were admitted in Government Hospital for Chest and Communicable Diseases. DECAF and BAP-65 Scores were calculated. Data was analysed using SPSS 22 version software. **Results:** In our study both DECAF score and BAP-65 score performed equally well for prediction of need for Mechanical Ventilation. The AUC for need for Mechanical Ventilation was 0.75 (95% CI=0.67–0.84) for DECAF score and 0.77 (95% CI=0.67–0.85) for BAP-65 score. The AUC for prediction of mortality for DECAF score was 0.81 (95% confidence interval [CI]=0.71–0.88) and for BAP-65 score was 0.79 (95% CI=0.67–0.89). Conclusions: DECAF and BAP-65 are good and also equal in predicting mortality as well as need for mechanical ventilation.

**KEYWORDS :** Mortality, COPD exacerbation, DECAF score, BAP 65 score, Mechanical ventilation, Dyspnea.

## INTRODUCTION-

India is experiencing a continued increase in burden of chronic obstructive pulmonary disease (COPD). With an estimated prevalence of>57 000 000 people suffering from obstructive airway diseases (OADs), at the end of 2016.[1] It will become the third most common cause of death and the fourth cause of disability in the world by the year 2020.[2] Despite exacerbations of chronic obstructive pulmonary disease (COPD) being both common and often fatal, accurate prognostication of patients hospitalized with an exacerbation is difficult.[3] For exacerbations complicated by consolidation, the CURB-65 (confusion, urea, respiratory rate, blood pressure, age>65) community acquired pneumonia prognostic score is often used to risk assess and guide antibiotic therapy but the CURB-65 as a prognostic tool was found to be suboptimal.[3] Prognostic indices have been thoroughly investigated and tools predicting mortality risk, such as the BODE score, are also well established. Prognostic research in exacerbations requiring hospitalization has been limited and there appears to be little common ground between predictors of mortality in stable disease and during COPD.[4] Furthermore, none of the prognostic tools developed in stable disease have been tested on hospitalised patients, and most require clinical measurements not routinely available at hospital admission.[5,6] In the field of COPD outside ICUs, it has never been demonstrated that using such a score has an effect on the appropriateness of medical decisions.[7] There are not enough studies available in Indian literature, hence we need to assess the usefulness DECAF score in predicting outcome in Indian subcontinent. This study intents to test a proposed (DECAF) Score on patients and validate the same to be used as a routine and effective score in predicting the outcome in acute exacerbations of COPD.

## Materials and Methods-

A Hospital based prospective observational study was conducted in the Government Hospital for Chest and Communicable Diseases a Tertiary care Hospital in Visakhapatnam, Andhra Pradesh. Sample size for this study is estimated based on AUC for DECAF score in a study by John S et al[3], with 95% confidence with margin of error as 7% with AUC 0.85%, the estimated sample size for the cross-sectional study was found to be 77 which was round to 80 COPD cases. Finally, we have taken 80 subjects. In this study, the patients with acute exacerbation of COPD who was present to general medicine hospital attached to Medical College between June 2021 and January 2022. The patients who meet the inclusion and exclusion criteria was taken and subjected to PFT and the DECAF and BAP-65 scores are applied.

### Inclusion criteria:

Inclusion criteria were primary diagnosis of COPD.

### Exclusion criteria:

Patients diagnosed with conditions like, bronchiectasis, bronchial asthma, malignancy, tuberculosis, congestive cardiac failure, coronary artery disease, pregnant and lactating women, patients with allergies including allergic reaction to medications or food. Patients diagnosed with atopic dermatitis, allergic rhinitis, crohns disease, ulcerative colitis, and vasculitis.

### Statistical analysis

Data was entered into Microsoft excel data sheet and was analyzed using SPSS 22 version software. Categorical data was represented in the form of Frequencies and proportions. Chi-square test or Fischer's exact test was used as test of significance for qualitative data. Continuous data was represented as mean and standard deviation. Independent t test was used as test of significance to identify the mean difference between two quantitative variables. A receiver operating characteristic (ROC) analysis was calculated to determine optimal cut off value for total DECAF score and total BAP-65 score. The area under the curve, the sensitivity, and the specificity were also calculated to analyze the diagnostic value of total DECAF score and total BAP-65 score. P value (probability that the result is true) of <0.05 was considered as statistically significant after assuming all the rules of statistical tests.

## RESULTS-

**Table 1- Demographic details of the Study Participants**

| Survived | | Died | P value |
|---|---|---|---|
| AGE in years | 66±8 | 74±8 | 0.01* |
| Gender (M/F) | 70/2 | 7/1 | 0.22 |
| Duration of COPD (in years) | 3±2 | 5±2 | 0.19 |
| Smoking in Pack years | 47±24 | 61±36 | 0.26 |
| Duration of ICU in days stay | 2.25±2.19 | 6.88±3.52 | .001* |
| Duration of hospital stay | 7.09±2.5 | 6.88±3.52 | 0.82 |

As per table 1 Out of 80 subjects 72 subjects were survived to discharge and 8 subjects were dead. 69 subjects didn't require mechanical ventilation and 11 subjects required mechanical ventilation. Mean age among survived was 66+8 years and Mean age among died was 74+8 years. There was statistically significant difference found between outcome and age. There was no statistically significant difference found between outcome and gender. Mean Duration of COPD among survived was 3+2 years and Mean Duration of COPD among died was 5+2 years, there was no statistically significant difference found between outcome. Mean smoking in pack years among survived was 47+24 pack years and mean smoking in pack years among died was 61+36 pack years, there was no statistically significant difference

found between outcome and Smoking in pack years. Mean Duration of ICU stay among survived was 2.25+ 2.19 days and mean duration of ICU stay among died was 6.88+3.52 days, there was a statistically significant difference found between outcome and duration of ICU stay.

**Table 2- Comparison of components of DECAF score according to outcome components of DECAF score and BAP score**

| Survived | | Died | P value |
|---|---|---|---|
| According to outcome components of DECAF score | | | |
| Dyspnoea score ≥1 | 23 | 5 | 0.01* |
| Eosinopenia <50 (score) | 60 | 5 | 0.88 |
| Consolidation | 32 | 4 | 0.43 |
| Acidemia PH<7.3 | 31 | 7 | .001* |
| Atrial fibrillation | 4 | 1 | 0.28 |
| According to outcome components of BAP-65 score | | | |
| BUN >25 mg/dl | 13 | 4 | 0.03* |
| Altered mental status | 4 | 7 | .001* |
| Pulse >109 BPM | 38 | 1 | 0.14 |
| Age >65 years | 49 | 6 | 0.27 |

As per table 2 When we compared components of DECAF score according to mortality there was statistically significant difference found between survivors and dead with respect to Acidemia and dyspnoea score≥1. Eosinopenia, consolidation and atrial fibrillation was not significantly associated with mortality. When we compared components of BAP-65 score according to mortality there was statistically significant difference found between survivors and dead with respect to BUN>25mg/dl and altered mental status. pulse>109 bpm and age>65years was not significantly associated with mortality.

**Table 3- Comparison of DECAF score and BAP 65 score in predicting mortality and predicting need for mechanical ventilation.**

| Predicting Mortality | | | Predicting need for mechanical ventilation | |
|---|---|---|---|---|
| | DECAF Score | BAP 65 Score | DECAF Score | BAP 65 Score |
| AUC (95% CI) | 0.81(0.71-0.88) | 0.79(0.69-0.86) | 0.75(0.67-0.84) | 0.77(0.67-0.85) |
| Cut off | >3 | >3 | >2 | >2 |
| Sensitivity (%) | 62.5 | 50 | 63.64 | 90.91 |
| Specificity (%) | 95.65 | 94.57 | 77.53 | 48.31 |
| PPV (%) | 55.6 | 44.4 | 25.9 | 17.9 |
| NPV (%) | 96.7 | 95.6 | 94.5 | 97.7 |
| P value | 0.01 | 0.03 | 0.01 | 0.01 |

As per table 3 AUC for prediction of mortality for DECAF score was 0.81 (95% confidence interval [CI]=0.71–0.88) and for BAP-65 score was 0.79 (95% CI=0.67–0.84). In our study both DECAF score and BAP-65 score performed equally well for prediction of need for mechanical ventilation. The AUC for need for mechanical ventilation was 0.75 (95% CI=0.67–0.84) for DECAF score and 0.77 (95% CI=0.67–0.85) for BAP-65 score. So for predicting mortality both DECAF and BAF-65 are not sensitive but they are highly specific which was statistically significant. ($p<0.05$)

## DISCUSSION-

Several tools have been proposed for prediction of mortality in COPD such as CURB-65, BAP-65 score, and DECAF score.8,9,10 The use of CURB-65 score for assessment and guidance of therapy in patients hospitalized with COPD complicated with consolidation has been shown to be suboptimal.10 DECAF score has been added very recently to the tools but lacks external validation. According to study by Steer et al DECAF score is a stronger prognostic score than CURB-65, APACHE, or COPD and asthma physiological score predictive tools. In our study mortality among subjects was 8% which can be comparable with the study by Steer et al.10 mortality among patients with COPD was 10.4%. In the study by Shorr et al mortality among patients with COPD was 4%, respectively.8 Mean age in patients who died is high 74+8years compare to 66+8 years who discharged which was statistically significant which was comparable to study Nafae et al which implies older age has high mortality.11 In a study done by Sangwan et al when individual components of DECAF score were compared between survivors and died patients, statistically significant difference was found in eMRCD Va, eosinopenia <0.05×109/l, consolidation and AF. Comparison of eMRCD Vb and academia pH<7.3 was not found to be significant.12 In a study done by Sangwan et al when individual components of BAP-65 score were compared between survivors and died patients, statistically significant difference was found in BUN>25, pulse>109 bpm and age >65 years.12 Comparison of altered mental status was not found to be significant. In our study The AUROC for prediction of mortality for DECAF score was 0.83 (95% confidence interval [CI]=0.74–0.89). similar to the study done by Steer et al.10

## CONCLUSION-

Both the scores that is DECAF and BAP -65 are good and also equal in predicting mortality as well as need for mechanical ventilation. Both scores can be easily applicable in COPD patients so that death during hospitalization for COPD and need for mechanical ventilation can be minimized.

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**Conflict of Interest-** None declared

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