Scholars Journal of Applied Medical Sciences
Abbreviated Key Title: Sch J App Med Sci
ISSN 2347-954X (Print) | ISSN 2320-6691 (Online)
Journal homepage: www.saspublishers.com

OPEN ACCESS

Medicine

Study of Microbial Pattern and BODE Index in Acute Exacerbations of COPD in Hilly Area of Kerala

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DOI: 10.36347/sjams.2019.v07i08.037 | **Received:** 20.08.2019 | **Accepted:** 27.08.2019 | **Published:** 30.08.2019

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Abstract **Original Research Article**

Objectives: This study was conducted to know the microbial pattern in acute exacerbation of chronic obstructive pulmonary disease patients and impact of BODE index in predicting prognosis and outcome in acute exacerbation of chronic obstructive pulmonary disease patients. ***Methods:*** We studied 138 patients of in acute exacerbation of chronic obstructive pulmonary disease admitted to medical ward of DM WIMS Medical College, Meppadi, Wayanad district, Kerala. All patients underwent thorough clinical examination including measurement of SPO2 and FEV1. Relevant Biochemical and microbiological tests were conducted. Patients were classified according to BODE index. ***Results:*** Out of 138 patients 88(63.7%) were males and 50(36.23%) were females. Mean age of patients: 52.81 ± 13.6 years. Smoking and exposure to biomass fuels were noted in patients. Microbial isolation was positive in 68.60% of patients. Pseudomonas species were isolated in most of the patients. Many patients were in BODE index -2 category. Most of the deaths were noted in BODE index- 3 category. ***Conclusion:*** Microbial data is very limited in acute exacerbation of chronic obstructive pulmonary disease patients. Early antibiotics usage according to culture report improves the outcome of acute exacerbation of chronic obstructive pulmonary disease patients. We need larger randomised studies to assess the microbial pattern and BODE index in acute exacerbation of chronic obstructive pulmonary disease patients.

Keywords: COPD, BODE index.

INTRODUCTION

COPD (chronic obstructive pulmonary disease) is defined as a disease state characterised by airflow obstruction that is not fully reversible [1]. It has got two components, one is emphysema and other is chronic bronchitis. It is preventable and treatable disease. The incidence of disease is increasing due to fast industrialisation and is directly related to smoking and exposure to biomass fuels.

About 80 million people are affected worldwide .It is third leading cause of death in the world [2]. WHO predicts, it will be become 4th leading cause of death worldwide by 2030 years [3]. The economic burden is more due to acute exacerbations and repeated hospital admissions [3]. It has been found that repeated exacerbations lead to increase in progressive decline in lung function in COPD patients [4].

The BODE index is important predictor of prognosis and death in COPD patients. The COPD patients in addition to respiratory abnormalities, they have got systemic manifestations like weight loss, skeletal muscle dysfunction, systemic inflammation and cardiovascular abnormalities.

Many different bacterial and viral infections are involved in acute exacerbation of COPD patients. It is important public health challenge to prevent and treat this disease worldwide.

Objectives

- To assess the microbial pattern present in acute exacerbation of COPD patients
- To evaluate BODE index in COPD acute exacerbations.

Inclusion Criteria

- Age more than 18 years
- Confirmed cases of COPD with acute exacerbation patients.

Exclusion Criteria

Patients with other respiratory diseases like bronchial asthama, cystic fibrosis, tuberculosis and bronchiectasis.

- Patients with associated cardiac diseases.
- Severely ill patients on ventilators.

MATERIALS AND METHODS

This is a crossectional observational study done during the year June 2025 to May 2016 in department of medicine of DM WIMS Medical College Kerala. Ours is a hilly area, climate is cold and most patients are exposed to cold climate and pollens.

We included 138 patients admitted with acute exacerbation of COPD in our study. An informed consent was obtained from all the patients to include in the study. All the patients underwent through clinical examination including measurement of SPO2 and FEV1.Biochemical tests like RBS Blood Urea, Serum Creatinine, and CBC were done on admission in all patients. Sputum for gram stain and culture sensitivity was obtained in all patients. ECG, Echocardiography was done to exclude any associated primary cardiac illness.

BODE INDEX was calculated by four variables

- BMI (B) – weight in kgs /height in square meters
- Airflow obstruction (O) – from spirometry post bronchodilator FEV1
- Dyspnoea (D) – calculated by patients history of dyspnoea on MMRC grading
- Exercise tolerance (E) - measured by 6 minutes walking distance

Scoring of BODE index

Variable	BODE INDEX			
	0	1	2	3
FEV1 (% PREDICTED)	>65	50 – 64	36 - 49	< 35
6 MWD (M)	>350	250 – 349	150 - 249	<149
MMRC DYSPNEA SCALE	0-1	2	3	4
BMI (K/M^2)	>21	<21	<21	<21

(Total bode index score is 0—10, BMI =body mass index, MMRC = modified medical research council), FEV1 = force expiratory volume in 1 st minute, 6 MWD = 6 minute walking distance in meters.)

Data analysis

Data analysis was done using EPIINFO. All results are expressed in percentage and means.

RESULTS

Out of 138 patients admitted with acute exacerbation of COPD 88 (63.76%) were males and 50 (36.23 %) were females. The patient's age was in the range of 45 years to 80 years. Men age of patients was 52.81 ± 13.6 years. All 88 male patients were smokers. All 50 female patients were non smokers. Smoking index was 980 ± 304.6. Passive smoking was noted in all female patients. Occupation exposure to biomass fuels was present in 36.8 %of patients. Microbial isolation was positive in 68.60% of patients.

Table-1: Pattern of microbe's isolatated

MICROBES	PERCENTAGE
Pseudomonas. spp	38 %
Klebsiella. spp	13 %
Acinetobacter. spp	08 %
Streptococcus. spp	15 %
MRSA	03 %
Staphylococcus .spp	13 %
H.Influenzae	10 %

.

Microbial species isolated were pseudomonas 38 %, klebsiella 13%, acinetobacter 8 %, MRSA 3 % 3 streptococcus 15%, staphylococcus 13 %, H. influenzae. Most common pathogen isolated was pseudomonas species.

Table-2: BODE index distribution was as follows.

Index	Distribution %
0	Nil
1	22 %
2	68 %
3	10 %

ECG abnormalities like atrial ectopics and atrial fibrillation were noted in 26.8% of patients. There were 13 (9.42 %) deaths in our study. All were in BODE index 3 group.

DISCUSSION

The burden of COPD and its exacerbation, hospitalisation has huge impact on the economy of country. Use of antibiotics in acute exacerbation of COPD is controversial (5). But if the clinical condition suggests of bacterial infection by fever and purulent sputum the antibiotics can be used, usual duration of antibiotics use is 5 - 10 days [6].

We observed most common organism isolated was pseudomonas species (8 %), which needs higher antibiotics to control it.Simillar observation was done in study by Chawala *et al*. showed 25.9 %of patients were infected with pseudomonas species [8] . Study by Madhvi *et al*. showed klebsiella as major pathogen. In our study also klebsiella was present in 13% of patients.

Groenwegen *et al*. study showed H. Influenzae as major pathogen [9]. Other organism isolated in our study was MRSA 3%, Staphylococcus aureus 25 %, which were present in other studies. The data on microbial pattern in acute exacerbation of COPD is very limited, needs further large studies.

BODE index is important predictor of prognosis and hospitalisation in acute exacerbation of COPD patients. Patients with higher BODE index have frequent acute exacerbation and hospitalisation. Study by Garcia rio *et al*. [10] and Augusti *et al.* [11] showed worsening prognosis with increasing BODE index. In our study more number of patients were in the BODE index 2and mortality were noted in patients with BODE index 3.

The early administration of antibiotics according to culture sensitivity can reduce morbidity and mortality in acute exacerbation of COPD patients. The BODE index and culture report help in management of acute exacerbation of COPD patients.

CONCLUSION

In hilly areas due to cold climate and pollens, cases of acute exacerbation of COPD are increasing. Pseudomonas, Klebsiella, staphylococci and streptococci are most commonly isolated organisms in acute exacerbation of COPD patients. Early antibiotics coverage in acute exacerbation of COPD patients helps in improving prognosis. BODE index helps in risk stratification and prognosis in acute exacerbation of COPD patients.

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