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HIGHER BODE INDEX IN COPD PATIENTS CORRELATED WITH HIGHER NUMBER OF COMORBIDITIES

Dr. Mohit Bhatia*[1], Dr. J. K. Samaria[2], Dr. Priyanka Dua[3] and Dr. J. K. Mishra[4]

[1]Senior Resident Department of T.B. and Respiratory Diseases IMS BHU Varanasi.
[2]Ex. Professor Department of T.B. and Respiratory Diseases IMS BHU Varanasi.
[3]Consultant Paediatrician at Galaxy Hospital Varanasi.
[4]Professor Department of T.B. and Respiratory Diseases IMS BHU Varanasi.

*Corresponding Author: Dr. Mohit Bhatia

Senior Resident Department of T.B. and Respiratory Diseases IMS BHU Varanasi.

ABSTRACT

Various systemic manifestations of COPD[1] are well known to us. One patient of COPD may have more than one associated comorbid conditions. BODE index is a composite marker of systemic inflammation in patients with COPD[2], has been proposed to better identify the disease severity and survival. In our study we tried to find out correlation between BODE index and total number of comorbidities in a single patient. We evaluated 50 patients of COPD, containing smokers, non-smokers and ex-smokers. Cardiac, diabetes, hypertension, osteoporosis, muscle wasting, psychological illness, anaemia were the most frequent comorbidities. Results indicate that there is association between BODE index and total number of comorbidities in a patient. Subjects with higher score in bode index have more associated comorbid conditions, which suggests these conditions may aggravate COPD course and increase risk of mortality.

KEY WORDS: BODE index, comorbidities, COPD.

INTRODUCTION

Chronic obstructive pulmonary disease is a common preventable and treatable disease.[3] Global Burden of Disease (GBD) studies estimated that COPD is the fourth leading cause of death globally and it has been estimated that it is going to be third leading cause of death by the year 2020.[4] Smoking is the most important risk factor found to be associated with COPD. Other risk factors include pollution, biomass fuel exposure and infections. Some host factors like α1-antitrypsin deficiency and low birth weight also play role in pathogenesis of COPD. In the present era COPD is not just a pulmonary disease, its various systemic manifestations are well known to us.[1] These comorbidities contribute to the overall severity in individual patients.[3] Some previous study for evaluation cause of mortality in COPD patients suggest that these patients are more likely to die because of comorbidities than from COPD.[5-7]

BODE (body mass index, airflow obstruction, dyspnoea, exercise capacity) index is a composite scoring system for COPD taking in to consideration systemic nature of disease. It has been validated as a tool for measuring COPD severity[8], predicting the risk of death from any cause and respiratory cause among COPD patients.[2] Some studies claim that it is better predictor of COPD

hospitalization than staging system defined in global initiative for chronic obstructive lung disease (GOLD)[8].

We, in this study evaluated various comorbid condition associated with COPD. We aimed to find relationship of BODE index with total number of comorbidities in a single patient. To our knowledge, this is the first study evaluating this relationship.

METHODS

Study design

This study was conducted in Sir Sunder Lal Hospital, Institute Of Medical Sciences, Banaras Hindu University Varanasi India after approval from local ethical committee between July 2012 to July 2014. It was a single centre cross- sectional study, which include 50 COPD patients, which were diagnosed as per standard definition and criteria given by GOLD that is post bronchodilator pulmonary function test confirmation (FEV1 / FVC < 0.7) with irreversible airway obstruction. Before including in the study all patients were screened for other causes of breathlessness like Bronchial Asthma, Interstitial lung diseases, heart failure etc., by channelling through detailed history, thorough physical examination and a battery of relevant investigations. All patients were free of exacerbation for at least 3 months.

Informed consent was obtained from all the patients included in the study.

Exclusion criteria were

a. Patients who presented with breathlessness not due to COPD but because of other disease like bronchial asthma, bronchiectasis interstitial lung diseases etc.
b. Patient in acute exacerbation of COPD.
c. Patients with multiple organ failure.
d. Haemodynamic instability.
e. Those patients who are not giving consent.

Now every patient included in study was screened for any associated comorbid conditions like diabetes, hypertension, cardiac diseases, renal impairment, osteoporosis, psychiatric illness, and muscle wasting etc. with the help of detailed clinical assessment and necessary investigations. Total numbers of comorbidities in a single patient were noted and all patients were classified accordingly.

Diabetes was defined as prior receiving oral hypoglycaemic drugs or insulin, or blood sugar fasting level above 126 mg/dl, random blood sugar above 200 0n several occasions or HbA1c level more than 7. Hypertension was defined on the basis of prior receiving antihypertensive therapy or whether BP exceeds 140/90 mm Hg for at least three measurements. Osteoporosis was defined according to T-score after DEXA scan as per WHO definition. To look for renal impairment serum creatininne levels, blood urea levels were measured and Glomerular filtration rate was calculated using Cockroft-Gault formula. Psychiatric illnesses were labelled after specialist evaluation. Muscle wasting was labelled after anthropometric measurements. For cardiac evaluation 2DECHO was used. Apart from these we also did arterial blood gas analysis, quantitative c reactive protein, lipid profiles and haemoglobin levels.

BODE index
BODE index was calculated by adding scores obtained as below:

Score	0	1	2	3
FEV1% pred	≥ 65	50-64	36-49	≤ 35
6MWD (m)	≥ 350	250-349	150-249	≤ 149
MMRC	0-1	2	3	4
BMI ($kg.m^{-2}$)	>21	≤ 21		

Total BODE Index score = 0 to 10 units
(FEV1% pred = predicted amount as a percentage of the forced expiratory lung volume in one second; 6MWD = six minute walking distance; MMRC = modified medical research council dyspnea scale; BMI = body mass index)

Statistical analysis
Obtained data analysed with the help of statistical software (SPSS 17.0). Frequencies of various comorbidities are expressed as percentage. Pearson product-moment correlation coefficient was used to assess correlation between BODE index and total number of comorbidities in a single patient.

RESULT
In our study we found various systemic manifestations of COPD like hypertension, diabetes, cardiac comorbidities, renal, dyslipidaemia, muscle wasting, osteoporosis and psychiatric illness [table 1]. We also found positive correlation between BODE index and total number of comorbidities in a single patient. We got Pearson product-moment correlation coefficient(r) = 0.661 and a significant p-value = <0.001 [Graph-1].

Table 1: Frequency table showing various comorbidities of COPD.

Comorbid disease	All subjects (n=50)	
	Frequency	**Percentage**
Hypertension	24	48
Coronary artery disease	06	12
Pulmonary hypertension	12	24
Left ventricular hypertrophy	07	14
Arrhythmias	05	10
Serum creatinine level (>1.2mg/dl)	18	36
Serum urea level (>50 mg/dl)	15	30
GFR(<30 ml/min/$1.73meter^2$)	04	08
Diabetes	12	24
Dyslipidaemia	12	24
Muscle wasting	13	26
Osteoporosis	21	42
Psychiatric illness	23	46

Table 2: Frequency table showing comorbidities distribution.

Total number of comorbid condition in single patients	Number of patients	Percentage
1	9	18
2	17	34
3	15	30
4	8	16
5	1	2

Table 3: Frequency table showing FEVI.

| FEVI (%)	Frequency	Percentage
<30	11	22.0
30-50	18	36.0
51-80	18	36.0
>80	3	6.0
Total	50	100.0

Table 4: Frequency table showing modified medical research council (MMRC) grading.

MMRC	Frequency	Percentage
Grade-0	0	0
Grade-1	8	16.0
Grade-2	16	32.0
Grade-3	10	20.0
Grade-4	16	32.0
Total	50	100.0

Table 5: Frequency table showing body mass index (BMI).

BMI (kg/m^2)	Frequency	Percent
>21	19	38.0
<21	31	62.0
Total	50	100.0
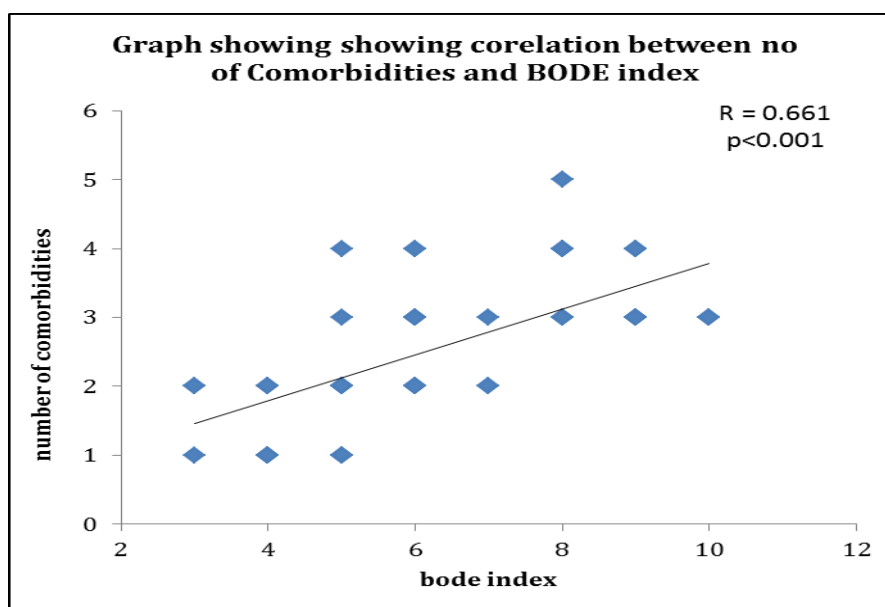
Graph: 1.

DISCUSSION

This study demonstrated that patient with COPD have various comorbid conditions. Cardiac and psychiatric illness was among more frequently found conditions. We showed that BODE index was associated with total number of comorbidities in a single patients. COPD patients having higher BODE index have higher number of comorbid conditions. This shows systemic nature of disease. Therefore, there is a great need to take into special account the incidence and severity of comorbid

conditions in a course of comprehensive assessment and treatment of COPD patients.

Evidence from previous studies suggests that multiple factors can be associated with mortality in COPD and a composite index may provide a more comprehensive evaluation of patient with COPD.[8, 9] Celli et al. introduced 4 essentially measured variables that predict an elevated risk of death: Body mass index (BMI), degree of airflow obstruction (FEV_1) dyspnea as measured by MRC dyspnea scale and exercise capacity measured by 6 minute walk test. These variables incorporated in a scale as BODE index, that ranged from 0(lowest risk) to 10 (highest risk). BODE index is simple and easily available tool, by this we can easily predict the patient with higher number of comorbid conditions and higher risk of mortality.

Recently it was suggested that therapy for COPD with existing medications targeting only lungs may not be enough to improve outcomes.[10] We consider that early preventive therapeutic interventions for various comorbid conditions may decrease mortality and morbidity in patient with COPD.

Limitations
The sample size of our study is relatively small to generalize our findings.

CONCLUSION
Our study revealed that assessment of BODE index could provide information about total number of various comorbid conditions in patient with COPD. Patient with higher BODE index have more comorbidities.so patient with higher BODE index should evaluated in detail with help of clinical examination and relevant investigations about associated comorbid conditions.

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