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BODE index in COPD patients and its correlation with GOLD severity staging in predicting severity in stable COPD patients

Dr.Manikumar Bandarupalli[1] (Post graduate),Dr.Varsha Kota [2](Post graduate),Dr.Mukesh kumar masetty[3] (Senior Resident),Dr.Niaz Farhat[4] (Assistant professor) ,

Department of Respiratory Medicine,
Mamata medical college and hospital,Khammam,Telangana.

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ABSTRACT: Background:-COPD has been implicated as the third leading cause for world wide mortality and morbidity.GOLD(Global initiative for chronic lung disease) uses FEV1 based staging system correlates poorly with symptoms of the patient,frequency of exacerbation , quality of life and intolerance to exercise.The multidimensional grading system,BODE index(body mass index ,airflow obstruction,dyspnea and exercise capacity)has been shown to be a better predictor of death among COPD patients than FEV1.

Methods:- This is a cross sectional study done in medical college hospital attending COPD patients and the obtained data is subjected to statistical analysis.

KEYWORDS:GOLD,COPD patients,BODE INDEX

I. INTRODUCTION

"Chronic obstructive pulmonary disease (COPD) is defined as a disease state characterized by persistent airflow limitation that is not fully reversible".

COPD includes:

1. "Emphysema, defined as abnormal permanent enlargement of distal airspaces, distal to terminal bronchioles, accompanied by destruction of their walls and without obvious fibrosis".[2]
2. "Chronic bronchitis, clinically defined as the presence of chronic productive cough on most days for three months, in each of two consecutive years, in a patient in whom other cause of chronic cough has been excluded".[2]

COPD has been implicated as the third leading cause for worldwide mortality and morbidity.[1] Exposure to tobacco smoking, outdoor, occupational and indoor air pollution is directly related to the prevalence of COPD. Spirometry is essential for diagnosis of COPD. A post bronchodilator Forced expiratory volume in 1 second (FEV_1) / Forced vital capacity (FVC) [FEV1/FVC] less than 0.70 is essential for the diagnosis of COPD. COPD has now been found to be a systemic disease which affects lungs as well as other organ systems. Global Initiative for Chronic Lung Disease (GOLD) uses FEV_1 based staging system for assessing the severity of the disease. It has been found that FEV_1 based staging system correlates poorly with symptoms of the patient, frequency of exacerbation, quality of life and intolerance to exercise. The multidimensional grading system, BODE index (body mass index, airflow obstruction , dyspnea and exercise capacity) has been shown to be a better predictor for risk of death among COPD patients than FEV_1. BODE index also-provides useful prognostic information.For assessment of quality of life, various questionnaires have been developed which helps to establish the impact of the disease on patient's life.

AIMS AND OBJECTIVES

1. To study its correlation with gold severity staging.
2. To study bode index as a predictor of severity in stable copd patients.

II. OBSERVATION AND RESULTS

GENDER DISTRIBUTION

In this study group of 50 patients, 44 patients were male and 6 patients were females. Males to female ratio are 7.3.Results was depicted in table below.

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SEX	FREQUENCY	PERCENT
Male	44	88.0
Female	6	12.0
Total	50	100.0

AGE DISTRIBUTION

In the study group, the maximum incidence was in the age group of 61-65 yrs is 32% followed by 56-60 yrs is 28%, 66-70 yrs is 26%, 51-55 yrs is 12% and least incidence is seen in the age group 71-74 yrs is 2%.

AGE	TOTAL	PERCENTAGE
51-55	6	12
56-60	14	28
61-65	16	32
66-70	13	26
71-74	1	2

Table : Baseline demographic characteristics of the population

Variables	N	Minimum	Maximum	Mean	Std. Deviation
Age in years	50	51	72	62.08	8.35
Pack Years	50	15	60	38.14	5.76
Duration of illness	50	3	7	4.92	1.066
No of Hospitalization in previous year	50	0	5	1.88	1.043
FEV1(L)	50	.85	1.64	1.29	0.19494

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Post bronchodilator FEV1%	50	41	88	58.64	7.28
Height (Cm)	50	155	179	167.84	6.78
Weight (Kg)	50	45	70	59.06	4.27
Body Mass Index	50	16.4	24.3	20.99	2.76
6 Minute Walking Distance(M)	50	142	360	246.94	54.43
MMRC Dyspnoea Grade	50	1	4	2.08	0.77
Bode Index Scores	50	0	9	4.06	2.12

Table : Symptoms among the study participants

Symptoms	Number of patients	Percentage of patients
Cough	40	80
Sputum	35	70
Shortness of breath	50	100
Wheeze	42	94

Association between GOLD severity stage and Bodes Index

Variables	**Mild (0)**	**Moderate (1)**	**Severe (2)**	**Very Severe (3)**
Gold Spirometry (FEV1 %)	4 (8%)	28 (56%)	16 (32%)	2 (4%)
BODE index	18 (36%)	14 (28%)	16 (32%)	2 (4%)
BMI	22 (44%)	28 (56%)	-	-
Spirometry (FEV1%)	18 (36%)	14 (28%)	16 (32%)	2 (4%)
MMRC	11 (22%)	26 (52%)	11 (22%)	2 (4%)

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6MWT	3 (6%)	27 (54%)	18 (36%)	2 (4%)

III. DISCUSSION

Chronic Obstructive Pulmonary Disease (COPD) is a common disease (in Lisbon BOLD survey the estimated prevalence of COPD was 14.2%2) and the World Health Organization (WHO) estimates that it will be the fifth leading cause of disability (DALYs) and the third leading cause of death by the end of 2030.

COPD patients often develop symptoms such as dyspnea, cough, chest tightness, exercise intolerance, sleep and mental disorders and social activity restriction, but COPD management and treatment have been largely based on spirometric assessment. Recently, GOLD guidelines proposed dyspnea measurement, health status/quality of life impairment, and number of exacerbations as key elements (in addition to spirometry) with which to manage and treat COPD, allowing health status and quality of life impairment to become part of overall COPD patients management and a major concern for physicians. [3]

The BODE index (body mass index, airflow obstruction, dyspnea, and exercise capacity) is a multidimensional grading system for COPD that includes symptoms assessment, nutritional state, exercise capacity and spirometric measure of airflow (FEV1 post-bronchodilator).BODE reflects the progressive modification in the disease and it is useful for predicting hospitalization and the risk of death among patients with COPD, in the follow-up of lung functional change during pulmonary rehabilitation, in predicting patient's survival after receiving lung volume reduction surgery.[4]

The mean (SD) age of study group was 62.08± 8.35 with an age range of 51-72 years. It is similar to that in studies by Reta et al.[5] In another study done by Khan et al the mean age of the COPD subjects was 58.3±16.1 years.

Cigarette smoking is the most important risk factor for COPD. In the U.S., approximately 80% of COPD deaths are linked to smoking, and 20% of smokers are expected to be diagnosed with COPD.[7]

In the present study, cumulative smoking pack years were 38.14 years among the COPD patients. Similarly in a study done by Bhatt et al. [8] in India the cumulative smoking years was 36.4 years.

Follow-up studies of COPD patients and meta-analyses of case–control studies have shown an association between COPD patients having low BMI and lower survival rates.[9] In the present study the mean Body mass index was 20.99 kg/m^2 which was in low BMI category. Similar to the present study, Sajal[10] reported the mean BMI of 20.2 +/- 4.3 kg/ m^2 among the COPD patients.

In the present study, the mean 6-MWD was 246.94 m among the COPD patients. Similar to the present study report , in Dajczma et al.[11] study the mean 6MWD was 188.3±91.1 m.

In the present study, mean post bronchodilator FEV1 % was 55.53%. Similarly in a study done by Ferrone et al.[12] the mean post bronchodilator FEV1 predicted was 58.64%.

The BODE index (body mass index, airflow obstruction, dyspnoea, and exercise capacity) is a multistage functional scoring system for COPD comprising an assessment of symptoms, a surrogate of the nutritional state, and exercise capacity together with the spirometric measure of airflow (FEV1).

In the present study the mean BODE index score was 4.06. Similarly, in a study done by Anami et al.[13] the mean BODE score was 3.9.

In the present study, among 50 patients majority of the patents were in Grade –II (52%), while 22% belonged to Grade I and III respectively and 4% of the patients were in Grade IV. Similarly in a study done by Anami et al.[13] the mMRC dyspnea score were grade I in 29%, II in 33%, III in 13% and IV in 13% of the patients respectively. Similarly in another study done by Kamath et al.[14]Modified medical research council score for dyspnea was applied to all study participants and a score of 0-1 was found in 33 (55%), 2 in 21 (35%), 3 in 4 (6.7%) and 4 in 2 (3.3%) patients.

In the present study, among 50 patients GOLD severity staging majority of the patients (56%) were in GOLD Stage II, while 32% were in GOLD Stage III, 8% in GOLD stage I and 4% were in GOLD stage IV. However, in a study done by Anami et al.[13] 15% of patients in GOLD stage I, 27% of patients in GOLD stage II, 42% of patients in GOLD stage III and 17% of patients in GOLD stage IV.

In another study done by Rahman et al.[15] 6% of the patients were in GOLD Stage I, 45% in GOLD Stage II, 32% in GOLD Stage III and 17% in GOLD Stage IV.

In this study, among the 50 patients majority of the patients had CAT score <10 constituting about 40% of the patients. Further, only 12% of the patients had CAT score in the range between 31-40. Similarly in a study done by

Sumer et al. 20% of patients had CAT score <10, 50% of the patients had CAT score 11-20, 24.3% of the patients had CAT score between 21-30 and 5.7% of the patients had CAT score between 31-40.

BODE score was significantly associated with the number of pack years of smoking. It was suggestive of the fact that higher duration of smoking was associated with higher BODE index. It was 19.47 pack yrs in mild cases (SD-6.725), 24.341 pack years in moderate (SD8.901) and 27.979 pack years in severe cases (SD-11.901) and it was found to be significant ($p<0.05$) on Pearsons correlation 0.453. In this study there was a significant association between Gold stage and Bodes index among the stable COPD patients (Chi square=6.43; p=0.001).

In this study, there was significant association between Bodes index quartiles and GOLD stage severity (Chi square= 65.45; p=0.007). In the Bodes index quartile 0-2 majority of the patients were in GOLD stage II with 8 patients, in quartiles 3-4 majority of the patients, 16 were in GOLD stage II, in quartiles 5-6 majority, 9 patients were GOLD stage III and in quartiles 7-10 majority, 5 patients were in GOLD stage III. Similarly in a study done by Reta et al.[5] using comprehensive BODE index assessment score most of the studied patients were in quartile IV 42 patients (52.50%) then quartile II 18(22.50%), quartile III 13(16.25%) and quartile I 7(8.75%).

IV. SUMMARY

In this study among 50 patients, 44 patients were males and male preponderance was observed in this study . The mean age of the study participants was 62.08±8.35 and the majority of them in the age range between 61-65 years. Cumulative smoking pack years were 38.14 and mean Body mass index was 20.99 kg/m2. Mean 6-MWD was 246.94 m and post bronchodilator FEV1 % was 58.64%. The mean BODE index score was 4.06.Regarding, MMRC grading majority of the patients were in Grade –II (52%), while 22% belonged to Grade I and III respectively and 4% of the patients were in Grade IV.

In GOLD severity staging majority of the patients (56%) were in GOLD Stage II, while 32% were in GOLD Stage III, 8% in GOLD stage I and 4% were in GOLD stage IV.

In this study, among the 50 patients majority of the patients had CAT score <10 constituting about 40% of the patients. Further, only 12% of the patients had CAT score in the range between 31-40.

In this study, BODE index and GOLD stages had highly significant correlation with duration of illness. Further, 6- minute walking distance with GOLD staging and BODE index displayed negative correlation.In this study, there was a significant association between Gold stage and Bodes index among the stable COPD patients with respect to FeV1.In this study, there was significant association between Bodes index quartiles and GOLD stage severity.

V. CONCLUSION

Thus the present study concludes that BODE Index and GOLD staging of COPD had a highly significant correlation. All variables used to grade COPD was positively correlated with highest association between BODE index and GOLD stage, FEV1% and 6MWDT, BODE index and FEV1%.

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