



The BODE Index and Health Related Quality of Life-Is there a correlation in COPD?

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ABSTRACT

Context: COPD a progressive respiratory disease, leads to permanent disability & a negative impact on the quality of life. BODE index, a multidimensional index provides prognostic information in COPD patients but it is not known whether it can be used as a sensitive tool for predicting the Health related quality of life (HRQoL). HRQoL is assessed using the St George Respiratory Questionnaire validated for the Indian population.

Aims: To Study correlation between BODE Index and HRQoL among stable COPD Patients.

Settings and Design: Cross sectional study conducted in a tertiary care center with a Pulmonology Outpatient department.

Methods and Material: The study was conducted among 50 stable COPD patients aged above 40 years for 12 months. The BODE index score and HRQoL were measured.

Statistical analysis used: A Spearman's (ρ) & Pearson's correlation coefficient (r) analysis were done to find out the correlation between different variables

Results: The BODE index was categorized into quartiles: 0-2, 3-4, 5-6 & 7-10. Mean total SGRQ scores and scores of individual components of the SGRQ increased with the increase in BODE index quartiles. Strong correlation ($\rho = 0.922$; $p < 0.001$) were found between baseline mean total SGRQ scores and BODE quartiles. When the individual components of BODE index were assessed, FEV1 % predicted and 6MWD had negative correlations and mMRC dyspnea grades had a positive correlation with the total SGRQ score. A lower BMI (≤ 21) was associated with higher total SGRQ score and vice versa.

Conclusion: Higher BODE quartiles were associated with higher SGRQ scores (worse health status). BMI and 6MWD showed a significant correlation with health related quality of life.

Key-words: COPD, BODE, SGRQ, HRQoL

Key messages: Lung function and exacerbation frequencies incorporated in GOLD guidelines for therapy decisions and prognostication ignores the Quality of life experienced by a patient. Multidimensional indices like BODE correlate well with health status assessed by the St George Respiratory Questionnaire and should be incorporated in future COPD guidelines.

Introduction

Chronic obstructive pulmonary disease (COPD) epitomised by persistent and progressive airflow limitation is characterized by progressive deterioration of respiratory function over time and systemic effects which have a great impact on health-related quality of life (HRQoL). The major manifestation of airflow obstruction in COPD is a reduction in forced expiratory volume in first second (FEV₁). This forms the basis of the classification of COPD severity by the Global initiative for Chronic obstructive lung disease (GOLD)¹. The evaluation of lung function by FEV₁ alone, though fails to represent the complex clinical consequences of COPD². FEV₁ as an individual measure also correlates poorly with patients symptoms, quality of life, exacerbation frequency and exercise intolerance^{4,5}. BODE index, a multidimensional parameter proposed by Celli et al³ in COPD, was reported to be superior to FEV₁ in reflecting the severity and predicting mortality of patients. Improving patients symptoms, functional status, and quality of life are important goals in the management of COPD and can be assessed using standardised questionnaires like the St George Respiratory Questionnaire (SGRQ)⁶. This study aims to know if BODE index can objectively correlate the HRQoL in stable COPD patients

Objective

To Study the Correlation between BODE Index with Health Related Quality of Life Among stable COPD Patients,

Subjects and Methods

A cross sectional study was conducted in 50 consecutive stable COPD patients attending the out-patient department of Pulmonary medicine from August 2015 to August 2016. Stable patients aged >40 years diagnosed as per ATS/ERS recommendations of Post bronchodilator (Post BD) FEV₁/FVC of < .7 using a COSMED spirometer were included. Those with other coexisting pulmonary diseases like

Bronchiectasis, Past Pulmonary Tuberculosis, Obstructive sleep apnoea, Asthma COPD overlap, Interstitial Lung diseases, Severe Pulmonary Hypertension and unable to do a Six Minute Walk Test(6MWT) and Spirometry were excluded.

After getting an informed consent, a detailed history and thorough physical examination were done in all patients. Body mass index (BMI) was calculated as Weight in Kilograms upon (Height in metres) . The distance walked in a 6MWT and Post BD FEV₁ percentage predicted values were noted in all patients. Severity of dyspnoea was assessed by the modified Medical Research Council (mMRC) dyspnoea grades. BODE index score was calculated by summation of scores obtained for each variable (BMI, Post BD FEV₁ %, mMRC dyspnoea and 6 min walk distance (6MWD)). The BODE score was divided into quartiles as follows: quartile 1 (a score of 0 to 2 points), quartile 2 (3 to 4 points), quartile 3 (5 to 6 points), and quartile 4 (7 to 10 points), higher quartiles indicating severe forms of COPD. Health related quality of life was measured using the English and vernacular versions of SGRQ validated to be used in the Indian population. The SGRQ is a fifty item questionnaire developed to measure health status in patients with obstructive airway diseases. Three domains were scored namely symptoms, activity, impact and a total score was generated. Randomised controlled trials have demonstrated sensitivity, repeatability, reliability and validity of this questionnaire in assessing Quality of Life in obstructive airway diseases.

Statistical analysis was carried out using SPSS 17 Data and were expressed as mean \pm Standard Deviation(SD). A Spearman's(ρ) correlation coefficient (r) analysis was done to find out the correlation between different variables.

Results

A total of 50 patients were included in the study. The mean age was 61.4 \pm 7.3years, and majority of

the study population (88%) were males as shown in Table 1 and Figure 1 respectively.

Table 1 showing age distribution

Age group	Frequency	Percent
45-60	23	46.0
>60 years	27	54.0
Total	50	100.0

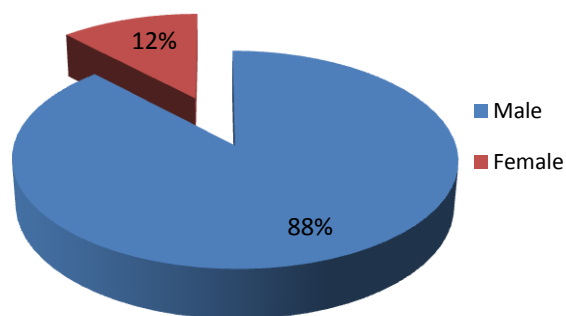


Figure 1 showing the sex distribution

Of the 50 patients, 43(86%) were smokers and 34 people among these had a pack year of 20-40 and 9 had less than twenty pack years. The mean pack years were 21.89 ± 10.33 . 7 people were non smokers. Assessment of BMI in the 50 patients showed a minimum value of 17 and a maximum of 23.9 with a mean BMI of 21.08 ± 1.33 kg/m². The BMI was classified into two groups as per the BODE scoring as shown in Table 2.

Table 2 showing Body Mass Index

BMI	Frequency	Percent
≤21	21	42.0
>21	29	58.0
Total	50	100.0

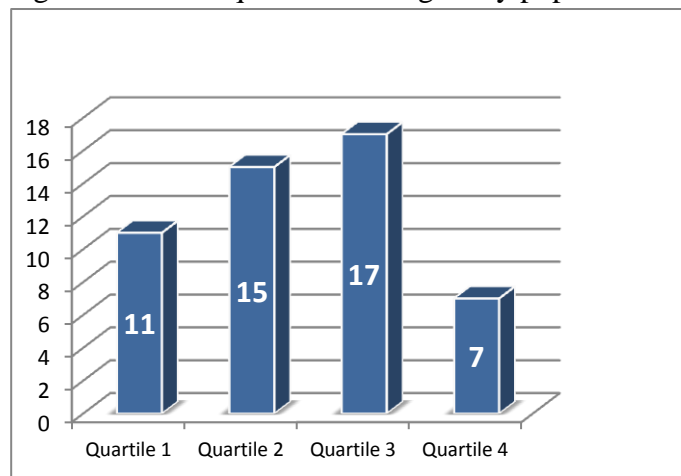
The mean post BD FEV1% predicted value of the study population was 55.87 ± 10.67 . We classified the values of post BD FEV1% as per the GOLD 2016 guidelines. 68% of our study population belonged to stage 2, 26% stage 3, 4% stage 1 and 2% to stage 4. We also segregated them based on their gender into different groups as seen in the Table 3.

Table 3 showing the FEV1 staging as per GOLD criteria

Stages	Male (n)	Female(n)	Total (n)	Percent
GOLD 1	2	0	2	4.0
GOLD 2	30	4	34	68.0
GOLD 3	12	1	13	26.0
GOLD 4	0	1	1	2.0
Total	44	6	50	100.0

As mentioned, we had categorized the calculated BODE scores for the subjects into quartiles: 0-2, 3-4, 5-6 & 7-10. 22% of the study population were in BODE 1st quartile, 30% were in 2nd quartile, 34% were in 3rd quartile and 14% were in the 4th quartile (Figure 2).

Figure 2: BODE quartiles among study population



The mean 6MWD in the study population was 233.2 ± 69.37 m and the mean SGRQ scores were as follows-Symptom 53.03, activity 56.74, impact 37.32 and a total score of 45.18 ± 18.4 . Subsequently we correlated the BODE quartiles with individual and mean SGRQ scores as seen in the following table 4

Table 4 : Distribution of SGRQ scores according to BODE Quartiles (SD- Standard Deviation)

BODE quartiles	Symptom	Activity	Impact	SGRQ score	
Quartile 1	Mean	27.27	36.64	14.20	22.12
	SD	7.37	4.87	5.96	5.34
Quartile 2	Mean	48.480	48.97	28.69	37.36
	SD	6.61	3.91	5.50	4.59
Quartile 3	Mean	64.26	61.66	47.19	54.27
	SD	6.85	14.14	8.88	8.26
Quartile 4	Mean	75.95	93.00	68.21	76.11
	SD	2.37	3.43	3.05	3.22
Total	Mean	53.03	56.74	37.33	45.18
	SD	17.71	19.53	1.88	18.41
Spearman's rho	.937	.881	.928	.922	
p value	<.001	<.001	<.001	<.001	

The mean total SGRQ scores and the individual parts of the SGRQ scores of symptom, activity and impact showed a statistically significant increase with incremental BODE quartiles. A strong correlation was found between BODE index quartiles and SGRQ scores. A pictorial line graph depicting BODE quartiles with individual scores of the SGRQ is shown in Figure 3. The numerical values of individual components of SGRQ as well as the mean total SGRQ scores increased with decrease in Post BD FEV1%, but showed only a moderate correlation ($p=.565$, $p<0.01$). Significant correlation was found in 6MWD and mMRC grades for both mean SGRQ scores and individual component of SGRQ score. So higher mMRC grades and lower 6MWD were associated with a lower SGRQ score. Lower BMI (≤ 21) was also associated with a higher total SGRQ score and higher BMI (>21) was associated with lower total SGRQ scores as seen in Table 5.

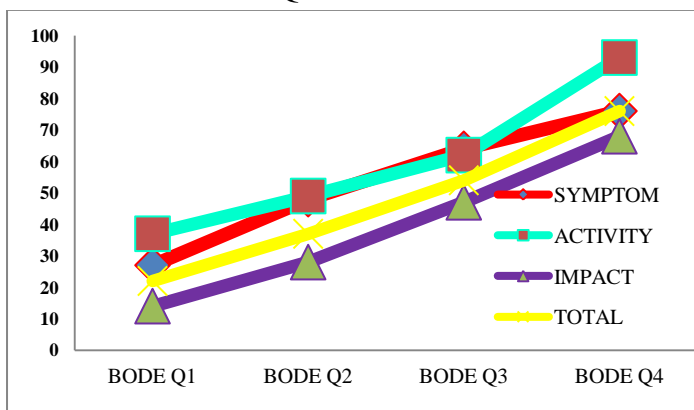


Figure 3 : Correlation between BODE quartiles and SGRQ score

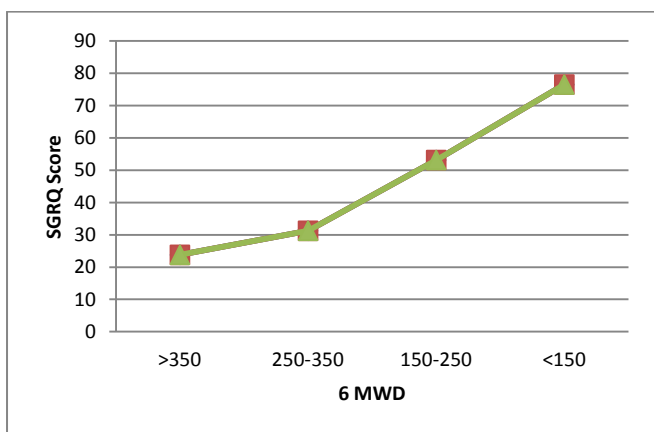


Figure 4 : 6 minute walk distance and mean SGRQ scores

Discussion

This study was conducted to find out the correlation between BODE index and health related quality of life as assessed by SGRQ score. Mean SGRQ score of the study population was 45.18 (SD= 18.41), with symptom domain mean of 53.03 (SD = 17.71), activity domain mean of 56.74 (SD=19.53) and impact domain mean of 37.33 (SD= 18.86). There is no statistically significant association between gender and SGRQ scores.

Previous studies regarding the correlation between FEV1 and SGRQ score found that FEV1 % is poorly or not at all correlated with SGRQ score⁷. FEV1 is not identified as a predictor of health-related quality of life in COPD patient. Antonelli-Incalzi *et al.* in their study found that the GOLD staging of COPD corresponded to important differences in health status between stages II and III, but not between other consecutive stages, and the authors concluded that crossing the boundary of a FEV1 of < 50% of predicted was a dramatic decline in health status⁸. In this study found that GOLD classes had modest correlation with baseline SGRQ score ($P = .565$, P value <0.001) and in SGRQ components symptom domain had good correlation ($p=.615$; P value <0.001) than activity ($P=.524$, P value <0.001) and impact domain ($P=.554$, P value <0.001).

In Sumithra *et al.* study, BODE index quartiles showed strong correlation with the activity and impact domain of SGRQ score, but showed moderate correlation with the symptom domain, but in this study all the three components² [symptom ($P=.937$; P value $<.001$), activity ($P=.881$; P value <0.001) and impact ($P=.928$; P value <0.001)] showed strong correlation with BODE index quartile. In this study also higher BODE quartiles were associated with higher (worse) SGRQ scores. The differences among the BODE quartiles in health status indexes were significant for total SGRQ as well as all three of the SGRQ components

Among the individual components of BODE index, the decrease of lung function

(FEV1% predicted), and 6MWD, and the increase of MMRC dyspnea grade were associated with corresponding increase in total SGRQ and SGRQ components (symptom, activity, impact). In these components BMI and FEV1% correlated modestly but 6MWD and mMRC dyspnoea grade correlated strongly with the total SGRQ score.

Several studies report weight loss in COPD subjects possibly due to the increased workload of laboured breathing and under-nutrition due to breathlessness from eating⁹. This in turn reduces both respiratory muscle strength, systemic muscle strength and endurance and participation in social activities. Indeed under-nourished COPD patients might be prone to recurrent infection which may lead to increased hospitalisation, reduced exercise capacity and increased mortality. However, in the present study, body mass index had only modest correlation with total SGRQ score ($P = .512$; P value < 0.001). In Lin *et al.* study¹⁰ also correlation between the BMI and total SGRQ scores was weak. Some authors have found a relationship between low BMI and peripheral muscle impairment and consequently low exercise capacity in individuals with COPD.

Main factor for limited daily activities and impaired quality of life in COPD patients were dyspnoea. mMRC scores are found to be responsible for the SGRQ score variance in different studies which showed that dyspnea perception could explain 25% to 54% of the quality of life score variance in COPD patients with a strong relationship between SGRQ assessed quality of life and dyspnea perception^{11,12}. In this study established a strong correlation between mMRC dyspnoea score and SGRQ score at baseline ($P = .873$; P value < 0.001). The exercise intolerance was a major factor for influencing quality of life in COPD patients. Similar to other studies, which showed a significant correlation between 6MWT distance and quality of life scores, this study also had a significant correlation between 6 MWD and SGRQ score (SGRQ score increased with 6MWD score; $P = .731$; P value < 0.001).

Conclusion

Higher BODE quartile were associated with higher SGRQ scores (worse health status). BMI and 6mwd showed a significant correlation with health related quality of life.

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