BMB AS A MARKER OF SEVERITY IN PATIENTS WITH COPD
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ABSTRACT

BACKGROUND
COPD has evolved overtime as a clinical syndrome rather than a disease that is limited to respiratory system and presently the systemic manifestations and comorbid illnesses are much better understood and known. Globally, as well as in India, the burden of COPD continues to increase and by 2030 it is expected to be the third leading cause of death. Although, the back bone of therapy is pharmacotherapy, the role of rehabilitation and management of systemic problems in COPD is increasing. One of the components of management of COPD other than the lungs include maintenance of nutrition and body weight of COPD patients as it has been shown in many studies that BMI tends to fall as the disease progresses and can be considered as a marker of severity. In this study, we have tried to study the nutritional state of COPD patients and correlate it with disease severity. In this study, the COPD patients were graded into three groups and percentage of patients with low normal and below normal BMI were studied in each group.

MATERIALS AND METHODS
A total of 108 COPD (chronic obstructive pulmonary disease) patients diagnosed based on smoking history and spirometry with post bronchodilator FEV1/FVC <0.7 were taken into the study at Bhaskar Medical College between 2015 and 2016. The severity of COPD was graded based on FEV1 (forced expiratory volume in first second) values recorded from spirometry after calibrating the spirometer daily with 3 litre syringe. The height and weight were recorded and BMI calculated by dividing weight in kilograms by height in metre square and then the BMI was graded as per WHO guidelines.

RESULTS
The BMI was low normal and below normal in 18.75% of patients with mild and moderate disease group (FEV1 50-80%). In patients with severe disease group (FEV1 30-50%), the BMI was low normal and below normal in 43.3% and in very severe disease group (FEV1 <30%), the BMI was low normal and below normal in 57.14%. The results has shown that as the disease progresses the BMI falls and is an important marker of severity of disease.

CONCLUSION
In COPD patients, as the disease progresses, BMI falls and it is an important marker of severity of disease and reflects poor nutritional status of patients with severe disease.

KEYWORDS
COPD, BMI and FEV1.

HOW TO CITE THIS ARTICLE: Ansari MSS. BMI as a marker of severity in patients with COPD. J. Evid. Based Med. Healthc. 2017; 4(15), 884-886. DOI: 10.18410/jebmh/2017/169

BACKGROUND
COPD is a clinical syndrome and a heterogenous disease with respiratory and systemic manifestations that effects the morbidity and mortality of patients.1-4 COPD is estimated to be the third leading killer by 2030.5 India along with other developing countries bear the brunt of COPD burden with ninety percent of deaths occurring in these countries.6 The number of deaths due to COPD in India are four times that of deaths in USA and Europe.7 The noncommunicable diseases accounted for 53% of all deaths and 44% of disability-adjusted life-years (DALYs) lost in 2005 in India and out of this chronic respiratory disease accounted for 7% deaths and 3% DALYs lost.8 The problems encountered in developing countries include problems of diagnosing COPD as there is lack of awareness among the family physicians and spirometry is underutilised. The reliable epidemiological data are lacking in our country. Although, the Indian guidelines for the management are available, these are not fully adhered to while treating these patients. Most COPD patients die because of the associated comorbid illnesses.9 BMI is an important method to measure adiposity and BMI is recommended by NBHL Institute10,11 and it contributes significantly to COPD phenotypes12,13 and predicts mortality.1,14 COPD is characterised by chronic obstruction of airways, which is partially reversible and is caused by noxious particles.15 In the systemic manifestations of COPD, wasting of body cell mass in organs other than lungs is an important manifestation. There is loss of muscle mass especially in the lower limbs. The loss of muscle mass is proved to be because of increased proteolysis.16,17 There is decrease in type I slow
muscle fires and increase in type II fast muscle fibres in severe COPD patients. As the disease progresses, the patients become breathless due to respiratory impairment and there is loss of muscle mass, muscle weakness and limitation of physical activity. This limitation leads to muscle deconditioning and it becomes a vicious cycle. To break this cycle, the patients are enrolled into rehabilitation programmes that guide them to enrol into muscle training programmes at the rehabilitation centre or at home. The second equally important factor is taking care of nutrition of these patients. The nutrition and rehabilitation combined help them improving the physical activity. The nutritional state of a patient is reflected by the BMI. The role of multidimensional assessment tools like BODE index, which includes BMI are not validated in India as marker of severity and progression of COPD disease.

AIMS AND OBJECTIVES
To study the nutritional status of COPD patients by measuring BMI in different groups of severity and study the relationship between BMI and disease severity measured by FEV1.

MATERIALS AND METHODS
A total of 108 COPD patients were recruited in the study at Bhaskar Medical College between 2015 and 2016. The inclusion done was done based on history of smoking and spirometry findings. A COPD patient was defined by spirometry criteria of post-bronchodilator FEV1/FVC <lower limit of normal who was past or a current smoker and age between 40 and 70 years. Both male and female subjects were enrolled. Patients with airway disease other than COPD were excluded.

Inclusion and Exclusion Criteria
The spirometry used an ultrasonic sensor technology and was calibrated with 3 litre syringe regularly. It was performed in sitting posture following the acceptability criteria. The difference of FVC between acceptable manoeuvres was <150 mL. The graphs were acceptable. The FEV1/FVC% and FEV1% were recorded and 200 micrograms of salbutamol was given with MDI and spacer. The patient was asked to wait for 15 minutes and post-bronchodilator manoeuvre was done and values recorded. The height was recorded by height measuring scale with bare feet and recorded in metres and weight recorded by weighing machine without shoes and recorded in kilograms. The BMI was then calculated by dividing the weight in kilograms by height in metre square. The BMI was graded as per WHO (World Health Organisation) grading of adult body weight.18

<table>
<thead>
<tr>
<th>COPD Grading as Per GOLD</th>
<th>FEV1/FVC</th>
<th>FEV1</th>
<th>BMI Grading as per WHO</th>
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</thead>
<tbody>
<tr>
<td>Mild obstruction</td>
<td>FEV1/FVC &lt;0.7</td>
<td>FEV1 70-80%</td>
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<tr>
<td>Moderate obstruction</td>
<td>FEV1/FVC &lt;0.7</td>
<td>FEV1 50-70%</td>
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<tr>
<td>Severe obstruction</td>
<td>FEV1/FVC &lt;0.7</td>
<td>FEV1 30-50%</td>
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<tr>
<td>Very severe obstruction</td>
<td>FEV1/FVC &lt;0.7</td>
<td>FEV1 &lt;30%</td>
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</tbody>
</table>

RESULTS
A total of 108 cases were recruited. FEV1 50-80% (mild and moderate disease). 64 patients. BMI <22 (low normal) 8 patients. <18.5 (below normal) 4 patients. Both combined (low normal and below normal) 18.75% of patients with mild disease.

FEV1 30-50% (severe disease) 30 patients. BMI <22 (low normal) 7 patients. <18.5 (below normal) 6 patients. Both combined (low normal and below normal) 43.33% of patients with moderate disease.

FEV1 <30% (very severe disease) 14 patients. BMI <22 (low normal) 5 patients. <18.5 (below normal) 3 patients. Both combined (low normal and below normal) 57.14% of patients with severe disease.

<table>
<thead>
<tr>
<th>Results of BMI vs. FEV1</th>
<th>BMI low normal &lt;22%</th>
<th>BMI below normal &lt;18.5%</th>
<th>BMI below normal and low normal</th>
</tr>
</thead>
<tbody>
<tr>
<td>FEV1 50-80% mild and moderate group</td>
<td>64 patients 8 4 18.75%</td>
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<td>14 patients 5 3 57.14%</td>
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It is observed from the above results that the relationship of BMI with FEV1 is linear. As the FEV1 falls from mild group of patients to very severe group of patients, the BMI also falls. This is reflected by increase in the percentage of patients with lower BMI in group with lower FEV1.
DISCUSSION
The BMI tends to fall as the disease progresses from mild-to-severe disease. The BMI which is part of BODE index predicts mortality of COPD patients.\textsuperscript{19} The higher BMI is a marker of better survival in COPD patients hospitalised for acute exacerbations.\textsuperscript{20} The prevalence of COPD patients is also shown to be more in patients with low BMI than patients with higher BMI.

It has been shown in studies that as the severity increases the BMI of COPD patients tends to fall.\textsuperscript{21} Thus, BMI is not only a marker of mortality and severity in chronic stable patients, it is also a marker of survival in acute exacerbations.

CONCLUSION
The BMI measured in chronic stable COPD patients is a good marker of severity of the disease and also reflects on the nutritional status of the patients.

ACKNOWLEDGEMENT
I thank the management of Bhaskar Medical College for giving me the opportunity of conducting this research work.

REFERENCES


\textsuperscript{9} Nussbaumer-Ochsner Y, Rabe KF. Systemic manifestations of COPD. Chest 2011;139(1):165-173.


