ORIGINAL RESEARCH

Assessment of burden of type 2 diabetes mellitus among chronic obstructive pulmonary disease patients

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ABSTRACT
Background: Non-communicable diseases (NCDs) are a burden on world health, including obesity, diabetes, cardiovascular disease, stroke, and chronic respiratory illnesses. The present study was conducted to assess the burden of type 2 diabetes mellitus among chronic obstructive pulmonary disease patients.
Materials & Methods:120 patients of both genders were enrolled. Estimation of fasting plasma glucose (FPG), postprandial plasma glucose,glycatedhemoglobin (HbA1C), and anthropometric measurements were done as per WHO guidelines. Type 2 diabetes mellitus was diagnosed as per the American Diabetes Association (ADA). As per the GOLDguidelines, the main criterion for COPD diagnosis is a FEV1/FVC ratio<70%.
Results: Out of 120 patients, males were 72 and females were 48. BMI was normal in 44, overweight/obese in 76. The duration of COPD <5 years was seen in 85 and >5 years in 35 patients. The severity of COPD was mild in 15, moderate in 26, severe in 34, and very severe in 45 patients. There were 35 T2DM, 15 were newly diagnosed T2DM and 70 patients had no DM. The difference was significant (P< 0.05).
Conclusion: Among COPD patients, T2DM was found to be quite prevalent.Among COPD patients, aging, and having the disease for a longer period were all significant non-modifiable risk factors for T2DM.
Keywords:chronic obstructive pulmonary disease, Diabetes mellitus, Non-communicable diseases

INTRODUCTION
Non-communicable diseases (NCDs) are a burden on world health, including obesity, diabetes, cardiovascular disease, stroke, and chronic respiratory illnesses.[1] By 2030, chronic obstructive pulmonary disease (COPD) is expected to rank third globally in terms of cause of death. These days, COPD is thought to be a multisystemic illness.[2] The individual's functional abilities and clinical characteristics are greatly impacted by co-occurring conditions linked to COPD. Diabetes mellitus (DM), systemic hypertension, ischemic heart disease, and heart failure are common comorbidities linked to COPD.[3] Of them, diabetes mellitus (DM) is a common comorbidity that affects COPD patients and has the potential to drastically change the course of the illness.[4]Given that both DM and COPD are pro-inflammatory diseases, there are pertinent similarities in their origin and progression.[5] Patients with COPD are more likely to develop type 2 diabetes because of a number of risk factors, including smoking, obesity, a sedentary lifestyle, elevated inflammatory levels, oxidative stress, and corticosteroid medication. Depending on the patient population under study, the prevalence of DM in COPD patients ranges from 2% to 37%. It is consistently linked to a 1.4–2.0-fold greater risk of acquiring DM.[6]The present study was conducted to assess the burden of type 2 diabetes mellitus among chronic obstructive pulmonary disease patients.

MATERIALS & METHODS
The present study consisted of 120 patients of both genders. All gave their written consent to participate in the study.Data such as name, age, gender, etc. was recorded. Estimation of fasting plasma glucose (FPG), postprandial plasma glucose,glycatedhemoglobin (HbA1C), and anthropometric measurements were done as per WHO guidelines. Type 2 diabetes mellitus was diagnosed as per the American Diabetes Association (ADA). As per the GOLDguidelines, the

main criterion for COPD diagnosis is a FEV1/FVC ratio<70%. COPD severity was classified as GOLD 1 (mild), GOLD 2(Moderate), GOLD 3 (Severe) and GOLD 4 (Very Severe), if FEV1 was ≥ 80%, predicted, 50% to <80% of predicted, 30% to <50% ofpredicted and <30% of predicted respectively. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS
Table: I Distribution of patients

| Total- 120		
Gender	Male	Female
Number	72	48

Table I shows that out of 120 patients, males were 72 and females were 48.

Table: II Assessment of parameters

Parameters	Variables	Number	P value
BMI	Normal	44	0.03
	Overweight/Obese	76	
Duration of COPD	<5 years	85	0.02
	>5 years	35	
Severity of COPD	Mild	15	0.05
	Moderate	26	
	Severe	34	
	Very severe	45	
T2DM	Known T2DM	35	0.04
	Newly Diagnosed T2DM	15	
	No DM	70	

Table I shows that BMI was normal in 44, overweight/obese in 76. The duration of COPD<5 years was seen in 85 and >5 years in 35 patients. The severity of COPD was mild in 15, moderate in 26, severe in 34, and very severe in 45 patients. There were 35 T2DM, 15 were newly diagnosed T2DM and 70 patients had no DM. The difference was significant (P< 0.05).

Graph: I Assessment of parameters
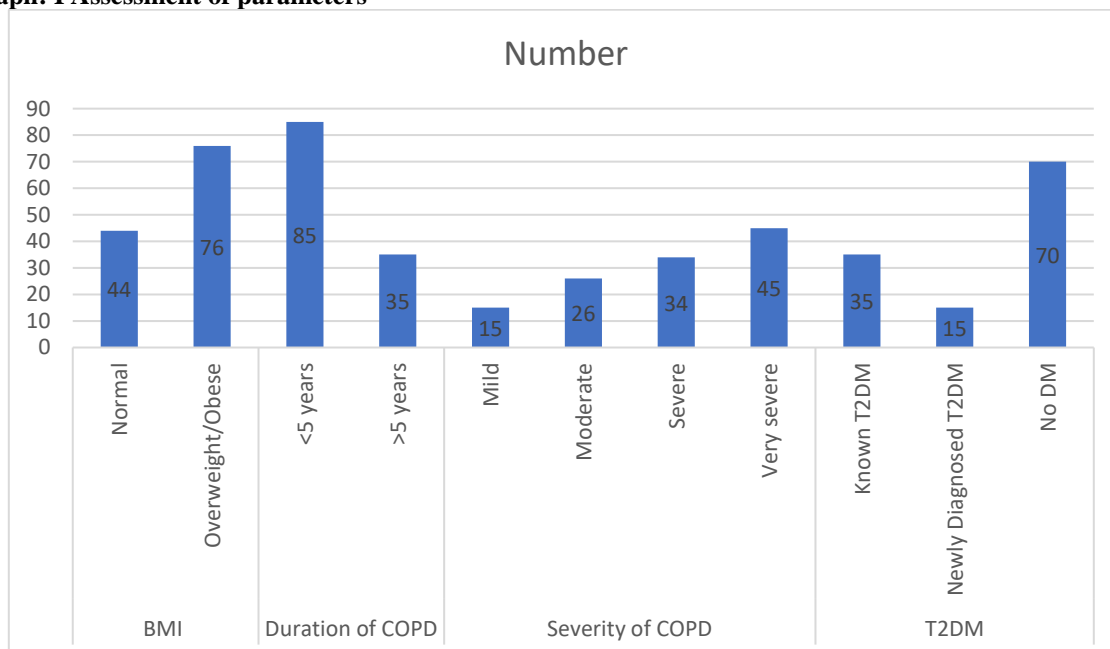
DISCUSSION
The burden of co-morbidity and economics can be significantly increased by COPD. Clinically, COPD is characterized by a chronic cough and dyspnea, which get worse as the illness advances.[7] Reduced expiratory flow rates are seen in all patients during pulmonary function testing. Co-morbidities such as metabolic syndrome, skeletal and muscular problems, cardiovascular diseases, etc., are often linked to COPD.[8] The prognosis and frequency of COPD exacerbations are impacted by these co-morbidities.the prevalence of DM is increasing

rapidly worldwide. India is considered the diabetes capital of the world with 41 million people having DM, and every fifth diabetic in the world is an Indian.Considering the significant change in lifestyle, food habits, decreased physical activity, and obesity in the Indian population, there has been an escalating epidemic of DM in both rural and urban Indian populations.[9] With India currently experiencing a demographic shift with a higher percentage of the elderly population, the coexistence of these two chronic disorders in an individual is very high which would worsen the morbidity and mortality of the individual.[10]The present study was conducted to assess the burden of type 2 diabetes mellitus among chronic obstructive pulmonary disease patients.We found that out of 120 patients, males were 72 and females were 48. Ajit et al[11]determined the prevalence of type 2 DM in COPD patients. The prevalence of DM was 23.05% (95) among 412 COPD patients studied. Thirty-five (8.49%) patients were newly diagnosed with DM. The prevalence in mild, moderate, severe, and very severe COPD was 14.73%, 18.94%, 36.84%, and 29.47%, respectively. DM group patients had a significant decline in lung function compared to non-DM group (mean forced expiratory volume 1% - 45.92 ± 4.22 v/s 56.64 ± 3.58, P = 0.001), and the majority of patients with DM (29.47%) were in exacerbation when compared to non-DM group (16.71%).We found that BMI was normal in 44, overweight/obese in 76. The duration of COPD<5 years was seen in 85 and >5 years in 35 patients. The severity of COPD was mild in 15, moderate in 26, severe in 34, and very severe in 45 patients. There were 35 T2DM, 15 were newly diagnosed T2DM and 70 patients had no DM. Kumar et al[12]found out the prevalence of type 2 diabetes mellitus (T2DM) among 369 COPD patients. The prevalence of T2DM was found to be 39.6%, 20.3% were known cases of T2DM, and 19.2% were newly diagnosed. Increasing age, female gender, urban residence, longer duration of COPD, high BMI, and smoking were found to be significant risk factors for T2DM among COPD patients. The presence of T2DM was associated with significantly more severe COPD cases.El-Habashy et al[13]studied the impact of DM and its control on pulmonary function and cardiopulmonary exercise tests.This is a cross-sectional study carried out on diabetic mellitus patients (type I or type II n = 30) group II divided into two subgroups (group IIA) controlled diabetes (HbA1c < 7%) (n = 15) and uncontrolled diabetes (group IIB) (HbA1c $\geqslant$ 7% (n = 15). The control group (group I) was non-diabetic healthy (n = 15). The following pulmonary function parameters were recorded: Forced Expiratory Volume in the first second (FEV1), Forced Expiratory Volume percent (FEV1/FVC %), Forced Expiratory Flow 25–75% (FEF 25–75%), peak expiratory flow (PEF) and MVV. Also, maximum aerobic power (VO2 max) using a cardiopulmonary exercise test was measured.

The mean FEV1, FEV1/FVC%, PEF, FEF 25–75%, MVV, and VO2 max values were low in diabetics compared to non-diabetics. Also, uncontrolled diabetics show a greater decrease in these values than controlled diabetics.The limitation of the study is the small sample size.

CONCLUSION
The authors found that among COPD patients, T2DM was found to be quite prevalent.Among COPD patients, aging, and having the disease for a longer period were all significant non-modifiable risk factors for T2DM.

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