International Journal of Advances in Medicine
Shashidhar et al. Int J Adv Med. 2020 Mar;7(3):382-385
http://www.ijmedicine.com
pISSN 2349-3925 | eISSN 2349-3933
DOI: http://dx.doi.org/10.18203/2349-3933.ijam20200590

Original Research Article

Study of microalbuminuria and its correlation with severity of disease in patients with chronic obstructive pulmonary disease

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Received: 24 January 2020
Accepted: 17 February 2020

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ABSTRACT

Background: Microalbuminuria is a marker of endothelial dysfunction and an important risk factor for cardiovascular diseases. Microalbuminuria may be seen due to hypoxemia in patients with chronic obstructive pulmonary disease (COPD). The objectives were to study the presence of microalbuminuria in patients with chronic obstructive pulmonary disease and to determine the relationship of microalbuminuria with severity of COPD using GOLD staging.
Methods: The study was done on 68 patients of COPD. Urine spot albumin measurement, pulmonary function tests, spirometry and GOLD staging were done. Severity of COPD was assessed by GOLD staging. Pearson Co-relation test and ANOVA test were used for statistical analysis.
Results: Statistical analysis showed that strong and statistically significant positive correlation of Microalbuminuria with GOLD staging($r = 0.749$, $p = 0.001$).
Conclusions: Microalbuminuria(MAB) was found to increase in patients with increasing severity of COPD. Hence its potential role as a marker of severity of disease and in predicting risk of cardiovascular disease can be explored.

Keywords: Chronic obstructive pulmonary disease, Gold staging, Microalbuminuria

INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is the most significant, and ever increasing, world public health problem. Its epidemiological clinical and economic impact will increase in near future. COPD is the fourth leading cause of death in the world and causing some 2.75 million deaths annually and global mortality is predicted to more than double by 2020.[1] It has potential extra-pulmonary effects, but it can be prevented and treated. Cardiovascular disease is the most common extra-pulmonary manifestations and therefore patients are at increased risk of morbidity and mortality due to cardiovascular events[2]. Microalbuminuria is a sensitive biomarker of endovascular dysfunction and a predictor of cardiovascular events. Vascular endothelial dysfunction is evident in patients with COPD.[2] Presence of Microalbuminuria denotes a state of generalized endothelial dysfunction and therefore it is a screening tool for early cardiovascular disease prevention[2] Microalbuminuria is common in COPD patients and it correlates significantly with severity of disease.[2-4] The aim of this study was to determine the presence of Microalbuminuria and its correlation with severity of disease in patients with COPD .

Aims

- To study the presence of microalbuminuria in patients with chronic obstructive pulmonary disease.

- To determine the relationship of microalbuminuria with severity of COPD using GOLD staging.

METHODS

The cross sectional study was conducted in the Department of Internal Medicine, Bangalore medical college and research Institute. Total of 67 patients diagnosed to have Chronic Obstructive Pulmonary Disease (COPD) were included. The diagnosis of COPD was based on clinical criteria suggested by GOLD guideline (2017). Study conducted between January 2017 to June 2018.

Inclusion criteria

- Age group: more than 18 years.
- Patients with signs and symptoms suggestive of COPD and those who are diagnosed previously by GOLD criteria are included in the study.

Exclusion criteria

- Spirometry proved bronchial asthma
- Inability to perform spirometry and six-minute walk test.
- Renal disease, CVD
- Diabetes mellitus
- Hypertension
- UTI, Malignancy

After including the patients based on inclusion and exclusion, Detailed history and thorough physical examination will be done. Dyspnoea based on MMRC grading assessed and classified accordingly. BMI was calculated and 6 minute walk test was done. Urine Microalbuminuria estimation, ECG, 2DEHO, urine routine, sputum culture and sensitivity were done.

Statistical analysis

Statistical analysis was performed using SPSS software. Data was analysed by descriptive statistics and MBA between various stages of patients with COPD was performed using ANOVA and Pearson correlation test. p-value of <0.001 was considered statistically significant.

RESULTS

Total number of study subjects were 67 COPD patients. Mean age in this study was 59.68 years with 8 females and 59 males included in the study (Table 1). In this study most of the patients were farmers (45(67.2%%)) and remaining patient had work involving travel and crowded (22(32.83%)). In this study predominant symptom of COPD patients was cough (100%) and breathlessness (100%) followed by chest pain in 35 (52.23%).

Table 1: Age and gender distribution.

Gender	Age
Female	8
Male	59

COPD severity using GOLD stage

Out of 67 subjects, 24 COPD patients (35.8%) were in gold staging II, followed by 22 patients (32.8%) in stage III, 15 (22.4) in stage IV and 9(61% in stage IV (Table 2).

Table 2: COPD severity by GOLD stage.

Gold stage	Fev1	Frequency
I	>80	6
II	50-79	24
III	30-49	22
IV	<30	15
Total		67

Out of 167 subjects, majority of them, 40 (59.8%) had normal BMI, 15 (22.38%) were underweight, 7 (10.44%) were overweight and only 5 (7.46%) were obese.

The distribution of subjects based on microalbuminuria

In this study all study subjects had microalbuminuria , 24 COPD patients (35.82%) had microalbuminuria in the range of 150 to 200, whereas 17 COPD patients (25.37%) had in the range of 101to 150, 12 patients (17.91%) of them in the range of 200 to 300 and only 14 patient(20.89%) had below 100 (Table 3).

Table 3: Microalbuminuria in the study population.

		Frequency
	0-50	8
MAB	50-100	6
	101-150	17
	150-200	24
	200-300	12

Correlation between MAB and severity of COPD using Gold stage

In this study authors had found that as the severity of the disease increases the amount of microalbumin also increases. And it is clinically significant with p value of <0.001 and r value of this correlation is 0.749 (Table 4).

DISCUSSION

Polatli et al, studied MAB and fibrinogen levels as markers of the severity in COPD exacerbation and concluded that the levels of plasma fibrinogen and MAB may be helpful in grading the severity of COPD.[5] In this

study also MAB showed a positive correlation with severity of disease.

In this study severity was assessed using various clinical and physiological parameters and these parameters were correlated with MAB levels which were found to be significant. Thus, MAB as a marker of endothelial dysfunction in COPD could make us aware of the future systemic outcomes like alterations in the microvasculature.

Table 4: Correlation between MAB and severity of COPD using GOLD stage Microalbuminuria.

		0-50	51-100	101-150	151-200	201-300	Mean
	I mild(6)	6(<30)	0	0	0	0	0
Gold stage	II moderate (24)	0	5	14	5	0	125.71
	III severe (22)	1	2	4	12	5	171.73
	1V very severe (15)	0	0	0		7	190.53
Total	67						144.07

p: <0.001, r : 0.749

In this study authors had observed microalbuminuria in all study subjects and majority of them had in GOLD stage II (24) and also noticed as severity of disease increased the value of microalbuminuria also increased thus correlates with severity of disease. Similarly, Mehmood K et al found that COPD patients with MAB had significantly lower levels of FEV1(p=0.0003) also a majority of COPD patients with MAB had GOLD stage of III and IV (33.3%) (p<0.0001). The possible explanation for this is that impaired lung function, including COPD, has been associated with increased systemic arterial stiffness.[2,3]

Celli et al, showed that BODE index is a better predictor of mortality for COPD patients than the classical FEV1 values alone. Increased BODE index values are observed in patients with more severe disease. Similarly, in this study, MAB which is predictive for cardiovascular disease risk, was related with GOLD stage and increased GOLD stage observed with more severe disease, and also related with pulmonary function parameters such as % FEV1 etc.[6]

Bulcun et al, where microalbuminuria was also associated with the severity of disease. Likewise, in the present study also authors noticed more albuminuria with severe disease and found in all study COPD patients.[7] The present study has several limitations. First, the relatively small sample size of the study may not be representative for subjects with COPD. And it is a cross sectional study and no control group. There is a need for further studies with larger sample sizes to confirm these findings. Furthermore, the cross-sectional structure of the data did not allow causal links to be established. Another limitation was that, because the number of female subjects was limited, possible sex differences in microalbuminuria could not been valuated.

Study by Shayo et al, showed Albuminuria was moderately significantly associated with COPD severity, p=0.049; (0.049<p<0.05).Similarly in this study albuminuria associated with COPD severity with p <0.001.[8]

Fulsen Bozkus et al, stated that urinary albumin creatinine ratio is significantly associated with severity of the disease as discussed by GOLD stage which was similar to this study.[9]

Poonam et al, study showed that Patients with severe COPD with hypoxemia or hypercapnia were significantly associated with microalbuminuria, similarly in this study also COPD with severity disease is associated with more microalbuminuria.[10]

CONCLUSION

Microalbuminuria was found to increase in patients with increasing severity of COPD. Hence its potential role as a marker of severity of disease and in predicting risk of cardiovascular disease can be explored.

Regular monitoring of MAB in patients with COPD can serve as simple , inexpensive tool for identification and early intervention of cardiovascular disease.

ACKNOWLEDGEMENTS

Author express heartfelt thanks to Dr. Madhumathi R, esteemed guide and Professor of Department of Medicine, Bangalore Medical College and Research Institute, Bangalore, for his persistent encouragement for the completion of this study. Author would like to thank all our patients for the cooperation during the study.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Shashidhar, Madhumathi R, Umeshchandara GA. Study of microalbuminuria and its correlation with severity of disease in patients with chronic obstructive pulmonary disease. Int J Adv Med 2020;7:382-5.