



## Chronic Kidney Disease -A Forgotten Comorbidity in COPD

Authors

**Dr Aditha Cibi Chakkravarthi T V<sup>1</sup>., Prof. Dr S. Balasubramaniyan.M.D<sup>2\*</sup>., Dr N.Paari M.D.<sup>3</sup>**

<sup>1</sup>Post Graduate, Department of General Medicine, Rajah Muthiah Medical College & Hospital, Annamalai University, Chidambaram, India – 608002

<sup>2</sup>Professor, Department of General Medicine, Rajah Muthiah Medical College & Hospital, Annamalai University, Chidambaram, India – 608002

<sup>3</sup>Assistant Professor, Department of General Medicine, Rajah Muthiah Medical College & Hospital, Annamalai University, Chidambaram, India – 608002.

\*Corresponding Author

**Prof. Dr S. Balasubramaniyan.M.D**

### Abstract

**Aim and Objective:** *To study the incidence of chronic kidney disease among patients with chronic obstructive pulmonary disease.*

**Methods:** *This is a prospective observational study conducted from November 2018 to October 2020. A total of 50 patients, diagnosed as COPD in ICU, IMCU, Ward of RMMCH were included the study after satisfying the inclusion and exclusion criteria. All the patients were subjected to clinical examination. Investigated with serum urea, creatinine, pulmonary function tests, abdominal ultrasound and EGFR calculation.*

**Result:** *Among the study population of 50 patients, 37(74%) of them had normal renal function, 13(26%) had chronic kidney disease. Among them 9(18%) had overt renal failure (eGFR<60, Creatinine >1.2) and 4(8%) had concealed renal failure (eGFR<60, Creatinine <1.2)*

1. *Incidence of chronic kidney disease was more among males (52.6%) in comparison to females (9.7)*
2. *Incidence of chronic kidney disease was found to be more among age 60 – 70(29%)*
3. *Incidence of chronic kidney disease (36.1%) was more in smokers with pack years of more than 40.*

**Conclusion:** *Results from our study shows the increased incidence of chronic kidney disease both overt and concealed variety among patients with COPD.*

**Keywords:** *Chronic Kidney Disease (CKD), Chronic Obstructive Pulmonary Disease (COPD).*

### Introduction

Chronic obstructive pulmonary disease is the 6th leading cause of mortality worldwide with yearly deaths of more than 10 million. It has multiple associated comorbidities like diabetes mellitus, systemic hypertension, metabolic syndrome. However, the incidence of chronic kidney disease in COPD is always underestimated because there is large group of COPD patients have reduced muscle mass due to muscle wasting, hence they have false low creatinine levels, so we underestimate the incidence of CKD because of near normal creatinine.

There is various hypothesis which suggest why there is increased incidence of CKD in COPD which includes,

- 1) There is an increased in renal arteriolar resistance in patients with COPD due to increased local sympathetic discharge, increased CO<sub>2</sub> will directly cause arteriolar constriction.<sup>[3]</sup>
- 2) Nicotine and heavy metals like lead and cadmium cause nephropathies producing albuminuria and worsening of chronic kidney disease<sup>[4]</sup>

- 3) COPD is a state of systemic inflammation with upregulations of TNF alpha,<sup>[5]</sup>
- 4) COPD cause secondary pulmonary hypertension which in turn causes worsening of renal functions<sup>[6]</sup>
- 5) There is increased incidence of coronary artery disease with COPD, thereby indirectly increasing cardio renal syndromes<sup>[7]</sup>

There are variety of reasons to identify the incidence of chronic kidney disease in COPD patients such as we can reduce or modify drug dosages. It is important to screen for chronic kidney disease in all COPD patients by measuring eGFR.

**Aims and Objectives**

To study the incidence of chronic kidney disease among patients with chronic obstructive pulmonary disease

**Methods**

This is a prospective observational study conducted from November 2018 to October 2020. A total of 50 COPD patients admitted with based on clinical features, spirometry in Department of General Medicine, who get admitted in WARD, ICU, IMCU are included in study.

**Inclusion criteria**

Patients who are diagnosed as to have COPD based on clinical features, spirometry.

**Exclusion Criteria**

Patients with COPD with other comorbid condition likely to cause renal failure.

- Diabetes Mellitus
- Hypertension
- Renal disease (Calculi; PKD)
- CAD
- Cardiac Failure
- Nephrotoxic drugs
- Cirrhosis

Patient were investigated with, Blood Urea, Serum creatinine, Serum electrolytes, CBC, Liver function tests, Urine analysis, ECG,USG Abdomen, pulmonary function test, Chest X - ray PA view, Sputum examination.

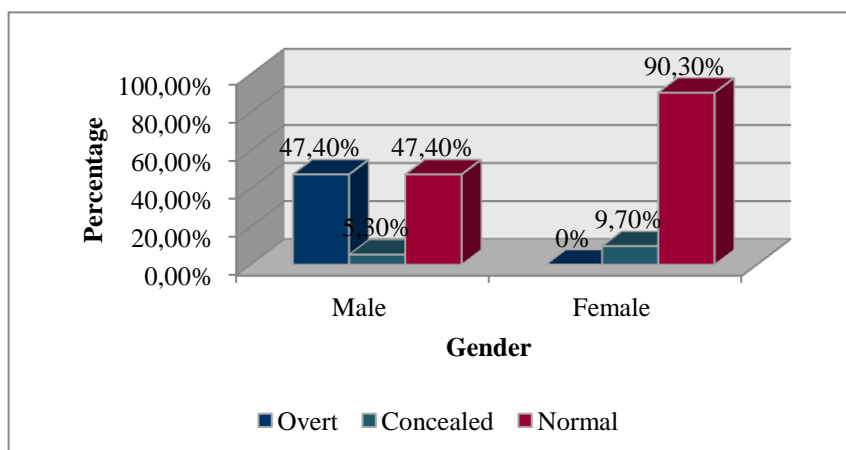
COPD was diagnosed using clinical features, spirometry and incidence of chronic kidney disease was found using eGFR estimation and USG abdomen.

Creatinine clearance is estimated using the four variable MDRD formula here.  $eGFR = 186 \times \text{Serum Creatinine}^{-1.154} \times \text{Age}^{-0.203} \times [0.742 \text{ if female}] * [1.210 \text{ if Black}]$ . A creatinine clearance <60ml/min is defined as renal failure. This cut-off is based on the National Kidney Foundation’s Kidney Diseases Outcome Quality Initiative Guidelines<sup>43</sup> which marks the threshold for moderate renal dysfunction.

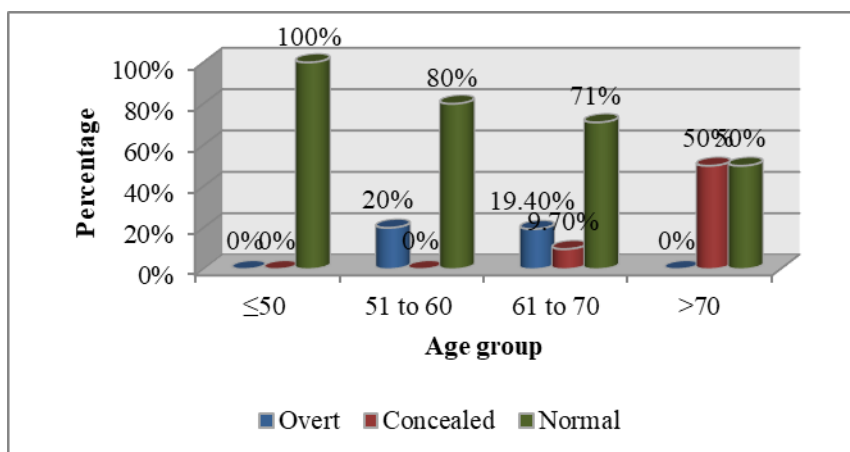
USG Abdomen – to screen for evidence of chronic kidney disease such as decreased renal size, loss of corticomedullary differentiation.

**Results**

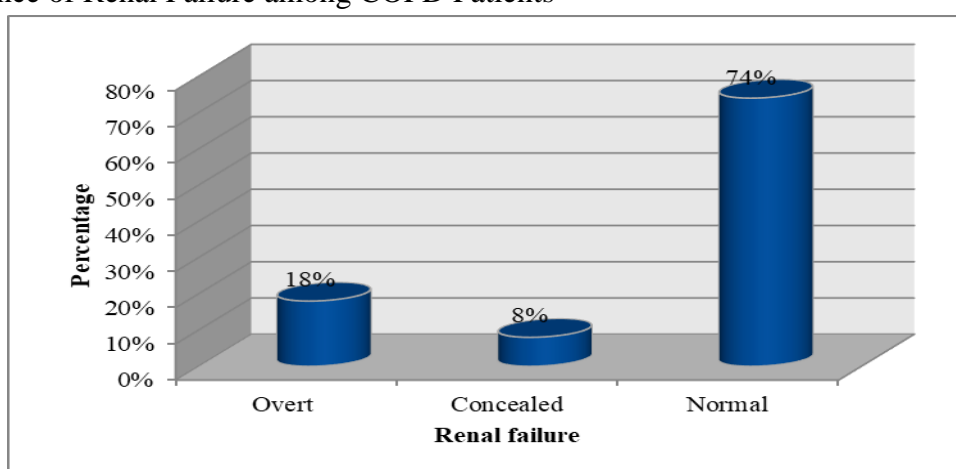
**Table 1** Gender Distribution of Renal Failure



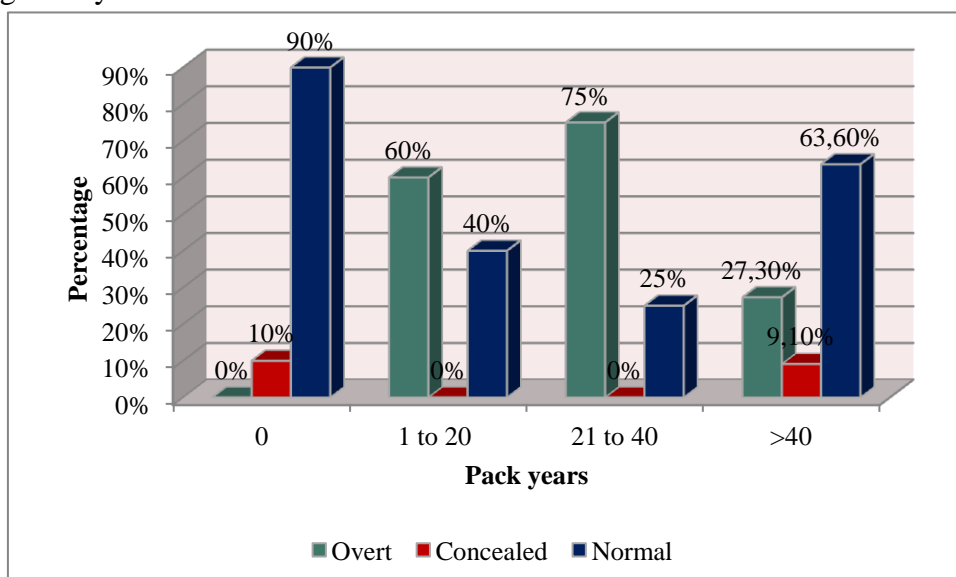
**Table 2** Age Distribution of Renal Failure



**Table 3** Prevalence of Renal Failure among COPD Patients



**Table 4** Smoking Pack years and Renal Failure



- Among the study population of 50 patients, 37(74%) of them had normal renal function, 13(26%) had chronic kidney disease. Among them 9 (18%) had overt renal failure

(eGFR<60, Creatinine >1.2) and 4 (8%) had concealed renal failure (eGFR<60, Creatinine <1.2) (P value <0.001).

- Incidence of chronic kidney disease was more among males (53%) in comparison to females (p value -0.003).
- Incidence of chronic kidney disease was more in smokers with pack years of more than 40 (36%) (P value- <0.001).
- Incidence of chronic kidney disease was found to be more among age 60 – 70 (29%) (P value -<0.001).

### Discussion

- In our study we found 26 % had chronic kidney disease. Out of them 18% had overt and 8 % had concealed renal failure .Similar results were found in Ibrahim L. Elmahallawy et al<sup>[1]</sup> reported an increased incidence of 46% of renal dysfunction among them prevalence of overt renal failure was 20% and prevalence of concealed renal failure was 26%.
- In our study, we found the incidence of chronic kidney disease was more among males in comparison to females. Ibrahim L.Elmahallawy et a<sup>[1]</sup> had found that the prevalence is more common among males and 70% of the overt renal dysfunction were males and 50% of the concealed renal dysfunction were males and it was statistically significant. It could possibly be due to increased prevalence of smoking in male.
- We also found that incidence of chronic kidney disease was more among people who smoke more than 40 pack years. The average pack years in the study done by Raffaele Antonelli Incalzi et al<sup>[2]</sup> were 40.7 among the concealed renal dysfunction and 50.7 among the overt renal dysfunction. Nicotine and heavy metals like lead and cadmium cause nephropathies producing albuminuria and worsening of chronic kidney disease
- In our study we found that the elderly more than 60 had high incidence of chronic kidney disease, Smilarly Raffaele Antonelli

Incalzi et al <sup>[2]</sup> found that the average age of prevalence of renal dysfunction was 66.3 for concealed variety and 65.8 for overt variety and had found that most of the patients with concealed variety were in the age group of > 60.

### Conclusion

In conclusion, results from our study supports the increased incidence of chronic kidney disease among patients with COPD. So we believe Chronic kidney disease is an important comorbidity of COPD, future studies need to be done on the above topic to understand the pathophysiological mechanism behind it.

### Reference

- 1 Ibrahim I. Elmahallawy a,\*, Mahmoud A Qora b Egyptian Journal of Chest Diseases and Tuberculosis (2013) 62, 221–227.
- 2 DOI 10.1378/chest.09-1710 Chest 2010;137;831-837; Prepublished online November 10, 2009; Investigators Extrapulmonary Consequences of COPD in the Elderly Study Battaglia, Giuseppe Paglino, Vincenzo Bellia and on behalf of the Raffaele Antonelli Incalzi, Andrea Corsonello, Claudio Pedone, Salvatore.
- 3 D.Chandra, J.A. Stamm, P.M. Palevsky, et al, The relationship between pulmonary emphysema and kidney function in smokers, Chest 11 (2012) 1456.
- 4 P.Palange, Renal and hormonal abnormalities in chronic obstructive pulmonary disease (COPD), Thorax 53 (1998) 989–991.
- 5 S. Satarug, P. Ujjin, Y. Vanavanitkun, et al, Effects of cigarette smoking and exposure to cadmium and lead on phenotypic variability of hepatic CYP2A6 and renal function biomarkers in men, Toxicology 204 (2004) 161–173.
- 6 M.J. Sevenoaks, R.A. Stockley, Chronic obstructive pulmonary disease, inflammation and co-morbidity - a

common inflammatory phenotype?, Respir Res. 7 (2006) 70.

- 7 J.B. Soriano, G.T. Visick, H. Muellerova, N. Payvandi, A.L. Hansell, Patterns of comorbidities in newly diagnosed COPD and asthma in primary care, Chest 128 (4) (2005) 2099 - 2107.