Section: Medicine

Original Research Article

INCIDENCE OF RENAL FAILURE IS MORE AMONG COPD PATIENTS: A CASE CONTROL STUDY FROM NAGPUR

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ABSTRACT

Background: COPD is commonly associated with other chronic diseases because of the common risk factors involved like cigarette smoking and obesity. These associated disease conditions might contribute significantly to the symptoms and severity in the affected patients. The diseases associated with COPD include congestive heart failure, arrhythmias, peripheral artery disease, coronary artery disease, diabetes, hypertension, osteoporosis, cachexia, chronic renal failure, infections and lung cancer. The objective is to determine whether the incidence of renal failure is more among COPD patients when compared with age matched control population.

Materials and Methods: Both male and female patients with COPD as cases and without COPD as controls visiting to Medicine at Department of Medicine at Datta Meghe Institute of Medical Sciences, Nagpur during the study period from December 2023 to December 2024.

Results: Majority of the cases i.e. 64% and controls i.e. 62% were from 61-70 years age group. Number of cases with abnormal serum creatine were significantly higher compared to controls ($p<0.05$). In our study, abnormal levels of creatine clearance were seen in 86% of cases and 50% of controls. It means number of cases with CKD severity were significantly higher compared to controls.

Conclusion: CKD severity was significantly higher in COPD cases compared to controls. Our study findings strongly support the association of increased prevalence of CKD in patients with COPD.

Keywords: Renal failure, COPD, Non-COPD.

INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a chronic inflammatory disorder characterized by irreversible airway obstruction. According to WHO estimates, COPD is poised to become the third leading cause of death, and the fifth leading contributor to overall morbidity burden by the year 2020.[1,2]

The prevalence of COPD in India is estimated to be 3.49% based on nationwide prevalence study conducted by ICMR.[3] But since these prevalence studies were conducted based on respiratory symptoms questionnaire and spirometry was not done to define irreversible airway obstruction it is estimated that the actual prevalence and disease burden may be higher. Apart from the mortality, COPD causes loss of productivity, huge increases in health expenditure and decreased quality of life.[4]

COPD is commonly associated with other chronic diseases because of the common risk factors involved like cigarette smoking and obesity. These associated disease conditions might contribute significantly to the symptoms and severity in the affected patients. The diseases associated with COPD include congestive heart failure, arrhythmias, peripheral artery disease, coronary artery disease, diabetes, hypertension, osteoporosis, cachexia, chronic renal failure, infections and lung cancer. It is important to screen COPD patients for the associated comorbid

illness since addressing these associated illnesses can lead to better patient management.[5-12]

COPD may lead to worse sleep quality and insomnia by virtue of respiratory symptoms, such as nocturnal cough and dyspnoea. Moreover, poor sleep quality could contribute to poor COPD related outcomes such as exacerbations or even mortality risk. Such adverse effects could operate through various pathways. Poor sleep quality could lead to impaired cognition, thus impairing COPD self-management behaviours.[13,14] Alternatively, poor sleep quality may impair immune function, contributing to the likelihood or severity of COPD exacerbations.[15,16] Poor sleep quality may act in ways that depend on the presence of underlying COPD, which underscores the need to study sleep disturbance specifically in COPD populations.

Objectives: To determine whether the incidence of renal failure is more among COPD patients when compared with age matched control population.

MATERIALS AND METHODS

Study setting: The present study was conducted at Department of Medicine at Datta Meghe Institute of Medical Sciences, Nagpur

Study population: Both male and female patients with COPD as cases and without COPD as controls visiting to Medicine and pulmonology department OPD as well as inpatients admitted in the same department of Datta Meghe Institute of Medical Sciences, Nagpur

Study Period: From December 2023 to December 2024

Study Design: Case Control study

Sample Size: We planned 50 cases and 50 controls in our study.

Sampling Technique: Simple random sampling technique used to select cases and controls

Inclusion Criteria

- Age above 40 years
- Diagnosed as having COPD on the basis of spirometry/clinical features
- Both OP and IP patients visiting to Medicine and Pulmonology department
- Those who are willing to participate in the study after consent

Exclusion Criteria

- Age below 40 years
- Patients with COPD who have other comorbid illness which are likely to cause renal failure are excluded.
- These comorbid illnesses include,
  - Diabetes mellitus
  - Known renal disease such as renal stones, polycystic kidney disease etc.
  - Coronary artery disease.
  - Cardiac failure.
  - Cirrhosis.
  - Ingestion of nephrotoxic drugs.
- Those who are not willing to participate in the study after consent

Methods of Data Collection: Information was collected through a pre-tested and structured proforma for each patient. Qualifying patients will be undergoing detailed history, clinical examination and laboratory investigations

Definition and classification of CKD:88

The Kidney Disease: Improving Global Outcomes (KDIGO) defines CKD as abnormalities of kidney structure or function, present for >3 months, with implications for health.

CKD is either kidney damage or decreased glomerular filtration rate <60 ml/min/1.73m2 for >3 months. Kidney damage is defined as pathological abnormalities or markers of damage, including abnormalities in blood or urine tests or imaging studies.

Criteria for CKD by KDIGO 2012 (Either of the Following Present for >3 Months)

1. Markers of kidney damage (one or more)
   - Albuminuria (albumin excretion rate [AER] ≥30 mg/24 hours; albumin to- creatinine ratio [ACR] ≥30 mg/g [≥3 mg/mmol])
   - Urine sediment abnormalities
   - Electrolyte and other abnormalities due to tubular disorders
   - Abnormalities detected by histology
   - Structural abnormalities detected by imaging
   - History of kidney transplantation
2. Decreased GFR <60 ml/min/1.73 m2 (GFR categories G3a–G5)

Statistical Analysis and Methods: Data was collected by using a structure proforma. Data thus was entered in MS excel sheet and analysed by using SPSS 24.0 version IBM USA. Qualitative data was expressed in terms of percentages and proportions. Quantitative data was expressed in terms of Mean and Standard deviation. Association between two qualitative variables was seen by using Chi square/ Fischer's exact test. Comparison of mean and SD between two groups will be done by using unpaired t test to assess whether the mean difference between groups is significant or not. Descriptive statistics of each variable was presented in terms of Mean, standard deviation, standard error of mean. A p value of <0.05 was considered as statistically significant whereas a p value <0.001 was considered as highly significant.

RESULTS

We included 100 cases and 100 controls in our study. Majority of the cases i.e. 64% and controls i.e. 62% were from 61-70 years age group.

Table 1: Distribution according to age group

		Cases		Controls	
		Frequency	Percent	Frequency	Percent
Age group in years	50-60	28	28.0	30	30.0
	61-70	64	64.0	62	62.0
	71-80	8	8.0	8	8.0
	Total	100	100.0	100	100.0

Table 2: Distribution according to gender

		Cases		Controls	
		Frequency	Percent	Frequency	Percent
Gender	Male	64	64.0	64	64.0
	Female	36	36.0	36	36.0
	Total	100	100.0	100	100.0

Equal number of males (64%) and females (36%) were included in our study.

Table 3: Distribution according to abnormal serum creatine in cases and controls

		Cases		Controls	
		Frequency	Percent	Frequency	Percent
Serum Creatine	Normal	76	76.0	94	94.0
	Abnormal	24	24.0	6	6.0
	Total	100	100.0	100	100.0

Chi square test-6.35, p-0.011(<0.05), Significant

Abnormal levels of serum creatine were seen in 24% of cases and 6% of controls. This difference in the proportion of cases and controls was found to be statistically significant (p<0.05). It means number of cases with abnormal serum creatine were significantly higher compared to controls.

Table 4: Distribution according to abnormal creatine clearance in cases and controls

		Cases		Controls	
		Frequency	Percent	Frequency	Percent
Creatine clearance	Normal	14	14.0	50	50.0
	Abnormal	86	86.0	50	50.0
	Total	100	100.0	100	100.0

Chi square test-0.088, p-0.76(>0.05), Not significant

Abnormal levels of creatine clearance were seen in 86% of cases and 50% of controls. This difference in the proportion of cases and controls was found to be statistically not significant (p>0.05)

Table 5: Prevalence of CKD stages in cases and controls

		Cases		Controls	
		Frequency	Percent	Frequency	Percent
CKD STAGE	1	12	12.0	62	62.0
	2	32	32.0	14	14.0
	3a	40	40.0	18	18.0
	3b	6	6.0	6	6.0
	4	6	6.0	0	0.0
	5	4	4.0	0	0.0
	Total	100	100.0	100	100.0

Chi square test-26.81, p-0.00001 (<0.001), Highly significant

Majority of the cases i.e. 46% were from CKD stage 3 compared to 24% of controls. This difference in the proportion of cases and controls was found to be statistically significant (p<0.001). It means number of cases with CKD severity were significantly higher compared to controls.

DISCUSSION

We included 100 cases and 100 controls in our study. Majority of the cases i.e. 64% and controls i.e. 62% were from 61-70 years age group. Equal number of males (64%) and females (36%) were included in our study. [Table 1 and 2]

Trudzinski FC et al,[10] reported in his study that the majority of all patients (60.6%) were male, and the mean ± SD age was 65.0 ± 8.4 years. Baha A et al,[11] carried out record-based study in which files of 320 patients with COPD and reported that Ninety (80.4%) of the patients were male and 23 (19.6%) were female. Elmahallawy II et al,[12] conducted a study that included 300 COPD patients aged 65.28 ±6.32 years, 148 of them (49.3%) were females and the rest were males and 300 control age and gender matched patients with diseases other than COPD; aged 64.70 ±7.12 years, 138 of them (46%) were males and the rest were females. Our findings are consistent with the findings of above-mentioned authors.

In our study, abnormal levels of serum creatine were seen in 24% of cases and 6% of controls. This difference in the proportion of cases and controls was found to be statistically significant ($p<0.05$). It means number of cases with abnormal serum creatine were significantly higher compared to controls. [Table 3]
In our study, abnormal levels of creatine clearance were seen in 86% of cases and 50% of controls. This difference in the proportion of cases and controls was found to be statistically not significant ($p>0.05$) [Table 4]
Baha A et al,[11] reported the prevalence of ARF in their study as 17.7% which is closely matching with our study findings.
Advancing age, diabetes, hypertension, body mass index (BMI), and cigarette smoking have previously been identified as risk factors for new-onset kidney disease.[13] Advancing age, history of asthma, severe respiratory problems in childhood, passive smoking, and exposure to biomass fuel for heating were identified as risk factors for COPD in never-smokers whereas increasing age, history of asthma, and severe respiratory problems in childhood, increasing lifetime exposure to cigarette smoking were identified as independent risk factors for development of COPD in ever-smokers.[14]
In our study, majority of the cases i.e. 46% were from CKD stage 3 compared to 24% of controls. This difference in the proportion of cases and controls was found to be statistically significant ($p<0.001$). It means number of cases with CKD severity were significantly higher compared to controls. [Table 5]
Trudzinski FC et al,[10] reported in his study that among the 161 patients with CKD, 114 (70.8%) were category 3A, 43 (26.7%) were category 3B, and 4 (2.5%) were category 4. Elmahallawy II et al,[12] reported that according to the GOLD classification; 18% (n= 54) of them had moderate COPD (stage II), 10% (n= 30) had severe COPD (stage III) and 72% (n =216) had very severe COPD (stage IV). Our findings are consistent with the findings of above-mentioned authors.

CONCLUSION

CKD severity was significantly higher in COPD cases compared to controls. Our study findings strongly support the association of increased prevalence of CKD in patients with COPD.

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