e-ISSN: 0975-1556, p-ISSN:2820-2643
Available online on www.ijpcr.com
International Journal of Pharmaceutical and Clinical Research 2024; 16(6); 1756-1758

Original Research Article

To Observe the Structural Changes in Pulmonary Systems Like Parenchymal, Airway, Vascular and Serosal Changes among Patients with CKD Over a Period of Six Months.

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Received: 25-05-2024 / Revised: 13-06-2024 / Accepted: 28-06-2024
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Conflict of interest: Nil

Abstract:

Background & Methods: The aim of the study is to observe the structural changes in pulmonary systems like parenchymal, airway, vascular and serosal changes among patients with CKD over a period of six months. The purpose of the study it to evaluate proportion of different changes taking places in pulmonary systems like parenchymal, airway, vascular and serosal changes among patients with CKD. As the variables are many and we can't have a single anticipated proportion to estimate the sample size, we consider anticipated proportion as 50% to get the maximum of the minimum sample size.

Results: Mean baseline serum creatinine was 2.19±0.69 mg/dl and after 6 months was 2.44±0.71 mg/dl. When we compared the mean values between two groups, the difference was found to be significant. It means serum creatine was elevated significantly after 6 months(<0.05). Mean baseline eGFR was 38.01±14.23 mL/min and after 6 months was 34.29±12.45 mL/min. When we compared the mean values between two groups, the difference was found to be significant. It means eGFR was reduced significantly after 6 months (<0.05).

Conclusion: We included total 118 patients in our study. Out of 118 subjects, majority of them were from 51-60- and 61-70-years age group i.e.34.7% each. It if followed by 12.7% patients from above 70 years age group. Mean age was 59.44±10.33 years. Prevalence pulmonary changes at the end of 6 months were noted along with the predictors. The pulmonary changes were evaluated through chest X ray PA view, oxygen saturation through pulse oximeter, pulmonary function test. Prevalence of diabetes was 85.6%.

Keywords: pulmonary, parenchymal, airway, vascular and CKD.
Study Design: Observational Study.

Introduction

Chronic kidney disease (CKD) encompasses a spectrum of different pathophysiological processes associated with abnormal kidney function and progressive decline in glomerular filtration rate (GFR). [1] CKD has become a major cause of morbidity and mortality. In the 2015 Global Burden of Disease Study, kidney disease was the 12th most common cause of death and CKD ranked as the 17th leading cause of morbidity worldwide. [2]

Physiologically, the lungs and kidneys are intricately related, not least as homeostatic organs controlling the cellular electrolyte and acid-base status that guarantee the best microenvironment for cellular function. Perceptually, pulmonary abnormalities may arise as a direct consequence of renal disease (primary consequences) or through generalized systemic processes that specifically involve both organ systems concomitantly. Varieties of pulmonary abnormalities including pulmonary edema, pleural effusion, alveolar hemorrhage, pulmonary and pleural fibrosis and calcification, pulmonary hypertension, pneumonia, acute respiratory distress syndrome, decreased pulmonary capillary blood flow and hypoxemia, sleep disturbance are seen in patients of CKD. [2,3,4] Impaired pulmonary function or structure may be due to direct effect of circulating uremic toxin or may indirectly result from fluid overload, anemia, immune suppression, extraosseous calcification, malnutrition, electrolyte disorders, acid base imbalances all these are common problems in ESRD patients. [5,6]

So, the present study is planned in order to assess the parenchymal, vascular, airway and serosal changes in pulmonary system that occurs in chronic kidney disease patients.

Material and Methods

All selected patients in the time frame of the study were enrolled. Minimum cases to be studied were around 118.

The purpose of the study it to evaluate proportion of different changes taking places in pulmonary systems like parenchymal, airway, vascular and serosal changes among patients with CKD. As the variables are many and we can't have a single anticipated proportion to estimate the sample size, we consider anticipated proportion as 50% to get the maximum of the minimum sample size.

Inclusion Criteria

- Outpatient with chronic kidney disease having informed consent with the following routine clinical investigation.
- Age > 18 years

Exclusion Criteria

The following are the exclusion criteria for the study.

- Patient known respiratory disease like COPD, Bronchial asthma.
- Known ILD (Interstitial Lung Disease) secondary to primary disease.
- Known connective tissue disorder.
- Patient having previous pulmonary tuberculosis.
- Patient having pulmonary infection within last 3 month for which admitted in the hospital.
- Patient having cardiac surgery.
- Any valvular heart disease.
- Patient on dialysis.
- Transplant patients.
- Patient on steroid therapy for any reason.
- Known neuromuscular disorder.

Result

Table 1: Distribution according to age group

		Frequency	Percent
Age group in years	30-40	7	5.9
	41-50	14	11.9
	51-60	41	34.7
	61-70	41	34.7
	>70	15	12.7
	Total	118	100.0

We included total 118 patients in our study. Out of 118 subjects, majority of them were from 51-60- and 61-70-years age group i.e.34.7% each. It if followed by 12.7% patients from above 70 years age group. Mean age was 59.44±10.33 years.

Table 2: Prevalence of diabetes

		Frequency	Percent
DM	Present	101	85.6
	Absent	17	14.4
	Total	118	100.0

Prevalence of diabetes was 85.6%

Table 3: Comparison of serum creatinine at baseline and after 6 months

		Mean	Std. Deviation	t	p	Inference
Serum creatine (mg/dL)	Baseline	2.19	0.69	-6.338	0.0001	Highly significant
	After 6 months	2.44	0.71		(<0.001)	

Mean baseline serum creatinine was 2.19±0.69 mg/dL and after 6 months was 2.44±0.71 mg/dL.
When we compared the mean values between two groups, the difference was found to be significant. It means serum creatine was elevated significantly after 6 months (<0.05).

Table 4: Comparison of eGFR at baseline and after 6 months

		Mean	Std. Deviation	t	p	Inference
eGFR(mL/min)	Baseline	38.01	14.23	5.897	0.0001	Highly significant
	After 6 months	34.29	12.45		(<0.001)	

Mean baseline eGFR was 38.01±14.23 mL/min and after 6 months was 34.29±12.45 mL/min. When we compared the mean values between two groups, the difference was found to be significant. It means eGFR was reduced significantly after 6 months (<0.05).

Table 5: Comparison of Hb at baseline and after 6 months

		Mean	Std. Deviation	t	p	Inference
Hb (gm/dL)	Baseline	11.83	1.07	3.371	0.001	Highly significant
	After 6 months	11.66	1.01		(<0.001)	

Mean baseline Hb was 11.83±1.07 gm/dL and after 6 months was 11.66±1.01 gm/dL. When we compared the mean values between two groups, the difference was found to be significant. It means Hb was reduced significantly after 6 months(<0.05).

Discussion

Mean baseline eGFR was 38.01±14.23mL/min and after 6 months was 34.29±12.45mL/min. When we compared the mean values between two groups, the difference was found to be significant. It means eGFR was reduced significantly after 6 months(<0.05).

Navaneethan SD et al[7] reported mean eGFR as 71.4±1.1 ml/min/1.73 sq. meter.

Kim SK et al [8] reported mean eGFR as 88.5±0.1 ml/min/1.73 sq. meter.

Navaneethan SD et al [7] reported mean FEV_1 as 2514.1±33.0 ml, FVC predicted as 93.3±0.7, FEV_1/FVC as 73±4 which is consistent with the results of our study.

In a representative sample of US adults aged 40–79 years, approximately one in four adults with CKD and one in five adults without kidney disease had underlying impaired lung function based on spirometry studies. The prevalence of restrictive lung function was found to be higher in those with CKD than those without. In addition to other factors, albuminuria was independently associated with higher odds of both obstructive and restrictive lung function, whereas lower eGFR was associated with higher odds of having obstructive lung function. Factors associated with obstructive and restrictive lung function were mostly similar among those with and without kidney disease. In the entire study cohort (2007–2008, 2009–2010 survey periods), older age and presence of obstructive lung function were associated with death.

Kim SK et al [9] reported FVC (%) as 95.1±0.1, FEV_1 (%) 103.1±0.1 and FEV_1/FVC ratio 0.81±0.06 in his study in CKD patients

Mukai H et al [10] found positive correlation between eGFR and FEV_1 as well as eGFR and FVC in their study.

We found that lower FEV_1/FVC ratio was associated with an increased risk of CKD during the mean follow-up.

The FEV_1/FVC ratio (Tiffeneau Index) is an index of airflow limitation.

To the best of our knowledge, only a few studies have explored associations between pulmonary function and CKD.

Conclusion

We included total 118 patients in our study. Out of 118 subjects, majority of them were from 51-60- and 61-70-years age group i.e.34.7% each. It if followed by 12.7% patients from above 70 years age group. Mean age was 59.44±10.33 years.

Prevalence pulmonary changes at the end of 6 months were noted along with the predictors. The pulmonary changes were evaluated through chest X ray PA view, oxygen saturation through pulse oximeter, pulmonary function test. Prevalence of diabetes was 85.6%.

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