

Prevalence of Pulmonary Disorders in Patients with End Stage Renal Disease on Hemodialysis

Ahmed E Kabil¹, Fareed Shawky Basyon¹, Mohamed Osama Nour², Khaled S. Makboul³

¹Department of Chest Diseases, Faculty of Medicine, Al-Azhar University, Egypt

²Department of Public Health and Community Medicine, Al-Azhar Faculty of Medicine, Damietta, Egypt, Faculty of Public Health and Health Informatics, Umm AL Qura University, Makkah, KSA.

³Department of Internal medicine, Faculty of Medicine, Al-Azhar University, Egypt

Corresponding author: Ahmed E Kabil, Mobile: 01006396601, Email: a_ka_81@hotmail.com

ABSTRACT

Background: The prevalence of patients with end stage renal disease is increasing. Pulmonary diseases have been suggested to be more common in end stage renal disease patients on haemodialysis.

Aim of the work: It was to evaluate the pulmonary function state and the prevalence of pulmonary disorders in hemodialysis patients. **Subjects and methods:** A retrospective study on 61 patients with chronic renal failure on regular Hemodialysis at El-Hussein University Hospital, Al-Azhar University. **Results:** The study included 61 chronic renal failure patients fulfilling the inclusion criteria with mean age 54.23 ± 10.07 years that ranged from 26 – 77 years old. Females represent 62.3%, about one third of patients (31.15%) were smokers and slightly more than half of them living in rural areas Pulmonary functions were affected in nearly half of them (restrictive 27.87%, obstructive 14.75% and mixed 6.56%). Variety of pulmonary disorders coexisted in about 69% of patients with 22.95% suffered from pleural effusion, 16.39% had TB, 11.48% and 8.20% developed pulmonary embolism and pulmonary edema respectively and finally community acquired pneumonia and uraemic asthma. **Conclusion:** Respiratory disorders especially restrictive lung pattern, pleural effusion, pneumonia and pulmonary embolism were associated with end stage renal disease on regular hemodialysis. **Recommendation:** Any patient with chronic renal failure, especially patients on regular hemodialysis should be observed early for detection of any pulmonary diseases or disorders.

Keywords: Renal failure, Hemodialysis, pulmonary disorders.

INTRODUCTION

Chronic kidney disease (CKD) is that type of kidney disorder in which there is gradual decline of kidney functions over a period of months up to years. It may be asymptomatic in early stages. Later, leg edema, tiredness, repeated vomiting, loss of appetite, or disturbed level of consciousness may develop. Complications may include cardiac diseases, elevated blood pressure, bone disorders, and anemia⁽¹⁾. Chronic kidney disease affected about 753 million people worldwide in 2016, including 417 million females and 336 million males. In 2015, it resulted in 1.2 million deaths. While in 1990, 409,000 deaths were reported. The causes that contribute to that large number of deaths included high blood pressure at 550,000, followed by diabetes at 418,000, and glomerulonephritis at 238,000⁽²⁾. Different pulmonary abnormalities, including pulmonary edema, pleural effusion, acute respiratory distress syndrome, pulmonary fibrosis and calcification, pulmonary hypertension, haemosiderosis, pleural fibrosis, and sleep apnea syndrome, have been reported in these patients⁽³⁾.

Impaired pulmonary function may be precipitated by the direct effect of circulating uremic toxins or may be indirectly caused by fluid overload, anemia, immune suppression, extraosseous calcification, malnutrition, electrolyte disorders, and/or acid-base imbalances, which are common issues in hemodialysis patients⁽⁴⁾.

Fluid overload, together with the marked increase in pulmonary capillary permeability can result in pulmonary edema and pleural effusion, abnormalities that may explain, at least in part, the decline in pulmonary functions. Since hemodialysis help in removing excess body fluid, it can also lead to improvement in pulmonary functions by decreasing the water content of both lungs⁽⁵⁾.

SUBJECT AND METHODS

The present study was a descriptive, retrospective study that conducted at El-Hussein University Hospital, Cairo, Egypt. 61 patients, referred for Chest Department for evaluation for any pulmonary disorders during the period from January 2016 to June 2017, were included in the current study. All patients were with end stage renal disease on hemodialysis. **The study was approved by the Hospital Ethical Committee and a written consent was obtained from each patient prior to the procedure.** All patients were subjected to the following: Full history taking, physical examination, plain chest x-ray: (postero-anterior and lateral views), complete blood picture, liver and kidney function tests, arterial blood gases, pulmonary function test and CT chest if needed for confirming the diagnosis of the pulmonary complications. All medical records of the patients were retrospectively revised.

Inclusion criteria: All patients had end stage renal disease and on hemodialysis.

Exclusion criteria: The following patients were excluded from the study: hemodynamically unstable patients, pregnancy, known cardiovascular disease, patients with chronic lung disease, such as COPD, bronchial asthma and interstitial lung diseases.

Statistical analysis

Statistical analysis was done using the SPSS computer package, version 19.0 (SPSS Inc., Chicago, Illinois, USA). For descriptive statistics, the mean ± SD was used for quantitative variables while the number and percentage were used for qualitative variables. In univariate analyses, the qualitative variables were compared by χ^2 -test or Fischer’s exact test when appropriate and the quantitative variables were compared by independent samples t-test. Sensitivity, specificity, accuracy, and positive and negative predictive values were calculated for the determination of tube placement. The statistical methods were verified, assuming a significant level of P value of less than 0.05 and a highly significant level of P value of less than 0.001.

RESULTS

The study included 61 chronic renal failure patients fulfilling the inclusion criteria with mean age 54.23 ± 10.07 years that ranged from 26 – 77 years old. Females represent 62.3%, about one third of patients (31.15%) were smokers and slightly more than half of them living in rural areas (Table 1).

Table (1): General characteristics of the studied sample

Variables		No=61%	
Age (year)	Mean ± SD Min - Max	54.23 ± 10.07 26.0 – 77.0	
Gender	Male	23	37.70
	Female	38	62.30
Smoking Habit	Smoker	19	31.15
	Non-smoker	42	68.85
Residence	Urban	29	47.54
	Rural	32	52.46

About 29.5% of patients were overweight and obese, comorbidity existed in about 73.8% of them (HTN 19.67%, DM 27.87% and CLD 26.23%) as shown in table 2).

Table (2): Clinical characteristics of the studied sample

Variables		No=61	%
BMI	Normal	29	47.54
	Under weight	14	22.95
	Over weight	9	14.75
	Obese	9	14.75
Co-morbidity	HTN	12	19.67
	DM	17	27.87
	CLD	16	26.23
	No	16	26.23

About 44.26% of patients were on regular dialysis

for a period of 6 – 12 months and 27.87% were either less than 6 months or more than 12 months. Whereas, nearly one third of them (32.79%) underwent dialysis once weekly (Table 3).

Table (3): Duration and frequency of dialysis of the studied sample

Variables		No=61	%
Duration of dialysis	< 6 months	17	27.87
	6 - 12 months	27	44.26
	> 12 months	17	27.87
Frequency of dialysis	Once weekly	20	32.79
	2 times / week	17	27.87
	3 times / week	24	39.34

Pulmonary functions were affected in nearly half of them (restrictive 27.87%, obstructive 14.75% and mixed 6.56%). Variety of pulmonary disorders coexisted in about 69% of patients with 22.95% suffered from pleural effusion, 16.39% had TB and 11.48% and 8.20% developed pulmonary embolism and pulmonary edema respectively. Finally, community acquired pneumonia and bronchial asthma (4.92% each) as shown in table 4).

Table (4): Clinical characteristics of the studied sample

Variables		No=61	%
Pulmonary function	Restrictive	17	27.87
	Obstructive	9	14.75
	Mixed	4	6.56
	Normal	31	50.82

Variety of pulmonary disorders coexisted in about 69% of patients with 22.95% suffered from pleural effusion, 16.39% had TB and 11.48% and 8.20% developed pulmonary embolism and pulmonary edema respectively. Finally, community acquired pneumonia and ureamic asthma (4.92% each) as shown in table 5).

Table (5): Clinical characteristics of the studied sample

Variables		No=61	%
Pulmonary disorders	Pulmonary edema	5	8.20
	TB	3	4.92
	Pleural effusion	14	22.95
	Pulmonary embolism	7	11.48
	Community acquired pn.	10	16.39
	Ureamic asthma	3	4.92
No	19	31.15	

Presence of pulmonary disorders among patients with chronic renal failure did not show significant relations with either age of patients, duration or frequency of dialysis. (Figure 1 and tables 6 and 7)

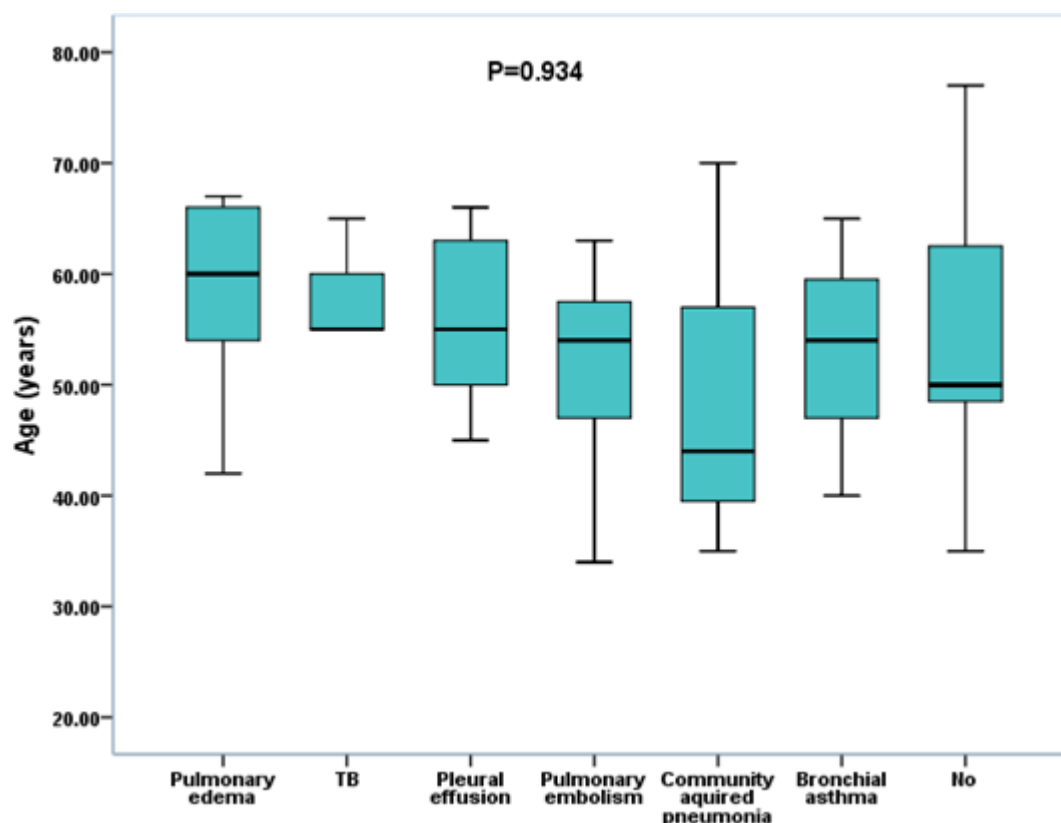


Figure (1): Mean age distribution according to pulmonary disorders of the studied sample.

Table (6): Duration of dialysis according to pulmonary disorders of the studied sample

Pulmonary disorders	Duration of dialysis		
	< 6 months N=17 (%)	6 - 12 months N=27 (%)	> 12 months N=17 (%)
Pulmonary edema	0 (0.0)	5 (18.5)	0 (0.0)
TB	4 (23.5)	5 (18.5)	1 (5.9)
Pleural effusion	6 (35.3)	4 (14.8)	4 (23.5)
Pulmonary embolism	1 (5.9)	3 (11.1)	3 (17.6)
Community acquired pneumonia	1 (5.9)	0 (0.0)	2 (11.8)
uraemic asthma	2 (11.8)	0 (0.0)	1 (5.9)
No	3 (17.6)	10 (37.0)	6 (35.5)
X ² = 18.34	P-value = 0.106		

Values present as number and percent & analyzed by Chi-Square test.

Table (7): Frequency of dialysis according to pulmonary disorders of the studied sample

Pulmonary disorders	Frequency of dialysis		
	Once weekly N=20 (%)	2 times / week N=17 (%)	3 times / week N=24 (%)
Pulmonary edema	0 (0.0)	4 (23.5)	1 (4.2)
TB	3 (15.0)	1 (5.9)	6 (25.0)
Pleural effusion	7 (35.0)	3 (17.6)	4 (16.7)
Pulmonary embolism	2 (10.0)	2 (11.8)	3 (12.5)
Community acquired pneumonia	1 (5.0)	1 (5.9)	1 (4.2)
Uraemic asthma	1 (5.0)	0 (0.0)	2 (8.3)
No	6 (30.0)	6 (35.3)	7 (29.2)
X ² = 12.79	P-value = 0.384		

Values present as number and percent & analyzed by Chi-Square test.

DISCUSSION

ESRD is worldwide health problem that increases morbidity and mortality and decreases quality of live. Prevalence of ESRD increases with increase in rate of DM, HTN, obesity and old age ⁽⁶⁾. Almost all body system adversely affected by ESRD, respiratory system is especially affected due to pulmonary complications, which increase in ESRD with hemodialysis ⁽⁷⁾.

In our study, we found that respiratory complication among patients with ESRD on renal dialysis with predominant pleural effusion, which affect 22.95% of patient. Variable proportion of pleural effusion have been reported in multiple study. Pleural effusion was previously reported in 16% ⁽⁸⁾ and 6.7% in another study ⁽⁹⁾. The high incidence in our study may be because we exclude patients on Lasix and pleural effusion, which can be caused by multiple factors, which may be different from country to other.

In our study, pulmonary tuberculosis was 16,39% of patients might be because most of patients from rural area (52.46% of the studied group).

In our study, community acquired pneumonia 4.92%, which is far less than reported cases in other studies 14% ⁽⁸⁾ and 26% ⁽⁹⁾. Infection caused morbidity and mortality in most patient with CKD ⁽¹¹⁾.

Uraemic asthma (patient was bronchospasm without history of bronchial asthma that respond with correction of renal conditions) represented 4.92 % of the studied group.

Pulmonary embolism affects 11.48% of the studied group. Pulmonary edema represented 8.20 % of the studied group. Variable proportion of pulmonary edema have been reported in previous study 22% ⁽⁸⁾ and 36% ⁽¹⁰⁾, which is higher than our result. This variation may be due to high cardiovascular risk profile of patient with ESRD in that study, as cardiovascular disease, which is the main cause of pulmonary oedema ⁽¹²⁾. In our study, we excluded patients with cardiovascular diseases. Pulmonary disorder coexist in 69% of the studied patients.

In our study, presence of pulmonary disorders among patients with chronic renal failure did not show significant relations with either age of patients, duration or frequency of dialysis. In other study, this complication increased with age ⁽⁸⁾, as CKD is more common in elder. Decline in renal function with increase in age was established in many studies ^(13, 14). In addition, co morbidity as DM and HTN, the major risk of CKD are more common in elder ⁽¹⁵⁾. This may be because most patients in our study had short duration of dialysis.

In our study, about 29.5% of patients were overweight and obese, co-morbidity existed in about 73.8% of them (HTN 19.67%, DM 27.87% and CLD 26.23%).

Pulmonary functions were affected in nearly half of them (restrictive 27.87%, obstructive 14.75% and

mixed 6.56%). These results are in agreement with many studies as **Sharma *et al.*** ⁽¹⁶⁾ where they reported that pulmonary function abnormalities were common among end stage renal disease patients. They also reported that the majority of patients had restrictive and mixed respiratory disorders.

CONCLUSION

Our study concluded that variety of pulmonary disorders can affect patients with end stage renal disease as pleural effusion, community acquired pneumonia, TB, pulmonary embolism, pulmonary edema and uraemic asthma. Pulmonary functions abnormalities especially restrictive lung disorders are more common in patients with end stage renal disease on regular haemodialysis.

RECOMMENDATION

Patients with chronic renal failure, especially on hemodialysis should be observed as early as possible for detection of any pulmonary disorders.

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