ORIGINAL RESEARCH PAPER
Volume - 10 | Issue - 06 | June - 2021 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

INCIDENCE OF EXUDATIVE PERICARDIAL FLUID, PLEURAL FLUID, ASCITES IN CKD/ESRD PATIENTS

General Medicine

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ABSTRACT

Aim: It is very difficult to know the exact etiology of exudative pleural effusion, pericardial effusion and ascites in advanced CKD/ESRD patient, so this study is being done to come to the reality. To determine the incidence of exudative pleural effusion, pericardial effusion and ascites.

Material and methods: This study includes all types of patients, from OPDs and IPDs of the Department of Internal Medicine, MLB Medical College, Jhansi (U.P.). This study includes 190 CKD/ESRD patient on hemodialysis. The study was conducted from March 2019 to October 2020.

Results: 100 patient were included in the study out of 190 patient. Mean age was 52.65 years i.e., 44% patients were between 51-60 years. Male:female ratio was 1.94:1 i.e., 66 patients were male & 34 patients were female. The etiology for exudative collection was uremia in 58% patients which was maximum, TB in 35% which was 2nd most common followed by Bacterial peritonitis in 5%, malignancy in 2%. The incidence of exudative fluid in ascites was 55%, pleural fluid was 37% and 8% in pericardial fluid.

Conclusion: This study Incidence of exudative pericardial fluid, pleural fluid and ascitic fluid in CKD/ESRD patients outlines the incidence of exudative fluid in CKD/ESRD patients in the state of Uttar Pradesh, India. The incidence of exudative ascitic fluid was found to be 55% among all patients. The incidence was predominantly noted in male patients compared to females, which is between 5th to 6th decade.

KEYWORDS

Pericardial Effusion, Uremic Pericarditis, Renal Disease

INTRODUCTION

Chronic kidney disease (CKD) is a worldwide health problem, with a global prevalence of CKD was 9.1% (697.5 million cases)[1]. CKD is associated with a high mortality and morbidity, high rates of hospitalization and rehospitilization, reduced quality of life and high healthcare cost related to both CKD itself and associated comorbidities.

Chronic kidney disease (CKD) encompasses a spectrum of patho-physiologic processes associated with abnormal kidney function and a progressive decline in glomerular filtration rate (GFR). The risk of CKD progression is closely linked to both the GFR and the amount of albuminuria[2]. The term end-stage renal disease represents a stage of CKD where the accumulation of toxins, fluid, and electrolytes normally excreted by the kidneys leads to death unless the toxins are removed by renal replacement therapy, using dialysis or kidney transplantation[2].

It is important to identify factors that increase the risk for CKD, even in individuals with normal GFR. Risk factors include small for gestation birth weight, childhood obesity, hypertension, diabetes mellitus, autoimmune disease, advanced age, African ancestry, a family history of kidney disease, a previous episode of acute kidney injury, and the presence of proteinuria, abnormal urinary sediment, or structural abnormalities of the urinary tract. It has been increasingly recognized that one or more episodes of acute kidney injury are associated with an increased risk of developing CKD[3].

The most frequent cause of CKD in North America and Europe is diabetic nephropathy, most often secondary to type 2 diabetes mellitus. Patients with newly diagnosed CKD often have hypertension.

AIM AND OBJECTIVES

- It is very difficult to know the exact etiology of exudative pleural effusion, pericardial effusion and ascites in advanced CKD/ESRD patient, so this study is being done to come to the reality.
- To determine the incidence of exudative pleural effusion, pericardial effusion and ascites.

MATERIAL AND METHODS

This study includes all types of patients, from OPDs and IPDs of the Department of Internal Medicine, MLB Medical College, Jhansi (U.P.). This study includes CKD/ESRD patient on hemodialysis irrespective of age and sex.

The study was conducted from March 2019 to October 2020.

Sample size:
- 190 patients

Study type:
- Cross sectional study

INCLUSION CRITERIA:
- All patients diagnosed as CKD/ESRD on hemodialysis with exudative ascitic fluid / Pleural fluid / Pericardial fluid.

EXCLUSION CRITERIA:
- CKD patient age <12 years
- Any patient having pre-existing renal disease
- Any patient having mild renal dysfunction
- Any patient having acute kidney injury with exudative pericardial, pleural effusion and ascites.

- **Light's criteria for Ascitic fluid**
  - Fluid protein/serum protein ratio > 0.5
  - Fluid LDH/Serum LDH > 0.6
  - Pleural fluid LDH > 400 UL.
  - Serum Ascites Albumin gradient (SAAG) <1.2 g/dl

Modification of Light's criteria for the differentiation of ascites.

Ascites	PF/serum protein ratio	PF/serum LD ratio	PF LD (U/L)
Transudative	<0.5	<0.6	<400
Exudative*	≥0.5	≥0.6	≥400

* Effusion are identified as exudative if at least two conditions are met.

- **Light's criteria for Pleural fluid**
  - Pleural fluid protein/serum protein ratio > 0.5
  - Pleural fluid LDH/Serum LDH > 0.6
  - Pleural fluid LDH > 2/3 URL
- Serum Effusion Albumin gradient (SEAG) < 1.2 g/dl

Light's criteria for the differentiation of pleural effusion.

Pleural fluid	PF/serum protein ratio	PF/serum LD ratio	PF LD (U/L)
Transudative	<0.5	<0.6	<2/3 URL
Exudative*	≥0.5	≥0.6	≥2/3URL

*Effusion are identified as exudative if one or more conditions are met.

LD – lactate dehydrogenase; PF – pleural fluid; URL – upper reference limit of serum LD.

- **Light's criteria for pericardial fluid**
  - Pericardial Fluid protein/serum protein ratio > 0.5
  - Pericardial Fluid LDH/Serum LDH > 0.6
  - pericardial fluid LDH > 200 U/L
- Serum Effusion Albumin gradient (SEAG) < 1.2 g/dl

STATISTICAL ANALYSIS:

SPSS (Statistical Package for Social Sciences) version 21.0 and Graph Pad (online) for windows will be used for data analysis. Mean and standard deviation are descriptive values for quantitative data with median and range for non-normally distributed data.

OBSERVATION AND RESULT

Table 1: Total Number Of Patients

Total number of patients	190
Number of patients excluded (drop outs)	90
Total number of patients included	**100**

Total no. of patients were 190, out of which 90 patients were excluded as they did not fulfill the inclusion criteria for study i.e. the fluid on analysis was transdutive in nature

Table 2: Age

Age (in years)	Number of patients	Percentage
18-30 years	6	6.00%
31-40 years	6	6.00%
41-50 years	21	21.00%
51-60 years	44	44.00%
>60 years	23	23.00%
Mean age	52.65	

Mean age was 52.65 years i.e., 44% patients were between 51-60 years.

Table 3: Gender Wise Distribution

Gender	No of patient	Ascitic fluid	Pleural fluid	Pericardial fluid
Male	66	36	25	5
Female	34	19	12	3
Total	100	55	37	8

Male: Female ratio was 1.94:1 i.e., 66 patients were male and 34 patient were female.

Table 4: Etiology

Etiology	Number of patients	Percentage
Uremia	58	58.00%
Tuberculosis	35	35.00%
Bacteria peritonitis	5	5.00%
Malignancy	2	2.00%
Total	100	100%

The etiology for exudative fluid was uremia in 58% patients which was maximum, TB in 35% which was 2nd most common followed by Bacterial peritonitis in 5% and malignancy in 2%.

Table 5: Incidence Of Exudative Fluid

Incidence of exudative fluid	Number of patients	Percentage
Peritoneal fluid (Ascites)	55	55.00%
Pleural fluid	37	37.00%
Pericardial fluid	8	8.00%
Total	100	100%

Incidence of exudative peritoneal fluid (ascites) was 55% while pleural effusion was 37% and pericardial effusion was 8%.

Table 6: Incidence Of Etiology Of Exudative Fluid

Incidence of etiology of exudative fluid	Number of patients	Uremia	TB	Other etiology	
				Bacteria peritonitis	Malignancy
Peritoneal fluid (Ascites)	55	31	18	5	1
Pleural fluid	37	20	16	0	1
Pericardial fluid	8	7	1	0	0

Incidence of Peritoneal fluid (Ascites) etiology is 55%, out of which 31 (56.36%) were of uremic origin, 18 (32.72%) were tubercular in origin and 6 (9.23%) were comprised of Bacteria peritonitis and malignant etiologies.

Table 7: Incidence Of Gender Wise Etiology Of Exudative Fluid In Ckd/esrd Patients

Exudative fluid	Ascites [N=55]			Pleural fluid [N=37]			Pericardial fluid [N=8]		
	No of pts	Male	Female	No of pts	Male	Female	No of pts	Male	Female
Uremic	31	19	12	20	14	6	7	5	2
Tubercular	18	12	6	16	12	4	1	0	1
Malignancy	1	1	0	1	0	1	0	0	0
Bacteria peritonitis	5	4	1	0	0	0	0	0	0

Table 7.1

Exudative fluid	Ascites [N=55]		
	No of patients	Male	Female
Uremic	31	19	12
Tubercular	18	12	6
Malignancy	1	1	0
Bacteria peritonitis	5	4	1

Out of 55 patients of exudative peritoneal fluid (ascites) fluid, 31 (56.36%) patients were uremic in origin with male predominance (61%) and 39% were female.

Table 7.2

Exudative fluid	Pleural fluid [N=37]		
	No of patients	Male	Female
Uremic	20	14	6
Tubercular	16	12	4
Malignancy	1	0	1
Bacteria peritonitis	0	0	0

Out of 37 patients of exudative pleural fluid, 20 patients were uremic in origin with male predominance (70%) and 30% females.

Table 7.3

Exudative fluid	Pericardial fluid [N=8]		
	No of patients	Male	Female
Uremic	7	5	2
Tubercular	1	0	1
Malignancy	0	0	0
Bacteria peritonitis	0	0	0

Out of 8 patients exudative pericardial fluid, 7 patients were uremic in origin with male predominance (71.4%) and 28.6% female.

Table 8: Uremia Patients On Hemodialysis

Patient on MHD (time/week)	No of patients	Outcome	
		Improved	Not improved
1 time	13	0	13
2 time	17	14	3
3 time	28	25	3
Total	58	39	19

Out of 58 uremic patients on hemodialysis, 39 patients showed improvement while 19 did not show any improvement. 64% of improved patients were on adequate dose of hemodialysis, ultrafiltration.

Table 9: Tuberculosis Patients On Hemodialysis

Patient on MHD (time/week)	No of patients	Outcome	
		Improved	Not improved
1 time	4	1	3
2 time	14	10	4
3 time	17	12	5
Total	35	23	12

Out of 35 tubercular chronic kidney disease (CKD) patients on

hemodialysis, 17 patients on hemodialysis 3 times/week and 14 patients were on 2 times/week, ~71% patients showed improvement while ~29% did not show any improvement.

Among the 12 patients who did not show any improvement probably due to variable compliance to ATT and irregular dose of the hemodialysis ultrafiltration and poor nutrition.

Table 10: Tb Patients With Hd+att And Hd+non Att

TB	No of patients	Outcome	
		Improved	Not improved
HD+ATT	25	23	2
HD+Non ATT	10	0	10

Among the 35 tubercular patients on hemodialysis, 25 patients were on ATT while 10 did not take proper ATT. Among the patients on ATT, 92% showed improvement while 8% did not show any improvement.

Among the 10 patients who did not take the regular ATT and hemodialysis, so that patient could not show any improvement.

Table 11: Bacteria Peritonitis Patients

Bacteria peritonitis	No of patients	Outcome	
		Improved	Not improved
Higher antibiotics+ Hemodialysis	4	4	0
HD with irregular treatment	1	0	1

Among the 5 patients of bacterial peritonitis on hemodialysis, 4 were kept on higher antibiotics while 1 was on irregular treatment. Among the patients on higher antibiotics, all of them showed improvement while the pt on irregular treatment did not show any improvement.

Table 12: Outcome

Outcome	Total number of patients	Etiology			
		Uremia	TB	Bacteria peritonitis	Malignancy
Improved	67	40	23	4	0
Not improved	33	18	12	1	2

Among 100 patients all were CKD on maintenance hemodialysis. 67% showed improvement while 33% of patients did not show any improvement.

Out of 67 patients, 40 (59%) patients were uremic, 23 (34.3%) of patients tubercular and 4 (2%) of patients bacterial peritonitis, showed improvement with adequate dose of hemodialysis, proper compliance of anti tubercular treatment and higher antibiotics.

Out of 33 patients, 18 (54%) patients were uremic, 12 (36%) of patient tubercular, 1 (3%) of patient bacterial peritonitis and 2 (6%) of patients of malignancy did not show any improvement due to poor compliance of hemodialysis, antitubercular treatment and not on proper antibiotics coverage and anti-cancer treatment.

DISCUSSION

The etiology of CKD varies considerably throughout India. This study showing the incidence of exudative pleural fluid, pericardial fluid and ascitic fluid in CKD/ESRD patients on hemodialysis was carried out during the period of March 2019 to October 2020 in the Department of Internal Medicine, in MLB Medical College, Jhansi, Uttar Pradesh. As of now, no study from India outlines of incidence of exudative pericardial fluid, pleural fluid and ascitic fluid in CKD/ESRD patients. In my study out of total 100 patients, 44% patient were in the age group of 51-60 years and the mean age was 52.65 years. In another study carried out by **T. Bakirci *et al*[4]** between 1990 and 2006 in Turkey the mean age was 55.83 years which is comparable to my study.

In my study out of total 100 patients; 66 patient were male while 34 patients were female, the ratio was 1.94%. In another study by **Z. Gluck *et al*[5]** in 1970 done in USA total patients were 118 and the M:F ratio was 2:1 which is comparable to my study. Another study done by **T. Bakiraci *et al*[4]** in Turkey out of total 25% patient were studied, the M:F ratio was 3:2.

In my study with was done on 100 patients, the most common etiology was uremia i.e. 58%. In another study done by **Guitti Pourdowlat et al in[6]** 2012 in Tehran, in which 76 patients were taken and uremia was the most common exudative etiologies.

In my study out of 100 patients, 55% patients developed ascites. Out of these 55 patients; etiology of 31 patient was uremia (56.36%). A study by **Abbas Ali Jasneem *et al*[7]** in Karachi, Pakistan from 2007 to 2014. Among the 90 patients; which were included, the etiology in 77.8% patients was uremic ascites.

In another study by **Abbas Ali Jasneem *et al*[8]** in Pakistan done between 2007-2014, among 9 patients, 52.5% developed uremic ascites.

37 patient of my study developed pleural effusion and the most common cause was uremia again (54.05%) similar study in 2017 by **Dr. A. Muralitharan *et al*[9]** in Tamil Nadu, total patient were 40 which developed pleural effusion and the main causes were heart failure, uremic and TB.

In my study 8 patient developed pericardial effusion and etiology in 7 patients was uremia. In a similar study be **Karim Abdur Rehman *et al*[10]** in 2017 of Cleveland Ohio. He studied (50 patients and in 62% patients.) there was pericardial effusion. The most common cause were uremia.

In my study out of total 58 patients in whom the cause was uremia, 40 patients improved after regular dialysis. In a similar study by **Gluck *et al*[5]** in 1987 done in USA, out of 38 pats. In whom cause was uremia 14 patient improved after regular dialysis.

In my study out of total 100 patients. The cause of CKD in 35 patients was tuberculosis. Out of which 23 patients improved after taking ATT and dialysis dose. In a similar study by **A. Prem Kumar *et al*[11]** from 2013 to 2014 with was done in Vishakhapattanam ATT produced improvement in clinical radiological status of 28% tubercular patients of CKD.

I could not find a study in which all three excudative fluids i.e. ascitic fluid, pleural effusion and pericardial effusion were considered in ESDR/CKD patients. So, I have compared my study parameter individually with other.

CONCLUSION

- This study Incidence of exudative pericardial fluid, pleural fluid and ascitic fluid in CKD/ESRD patients outlines the incidence of exudative fluid in CKD/ESRD patients in the state of Uttar Pradesh, India.
- The incidence of exudative ascitic fluid was found to be 55% among all patients.
- The incidence was predominantly noted in male patients compared to females, which is between 5th to 6th decade.
- In this study, the most common etiology of exudative fluid was uremic effusion followed by tubercular etiology.
- Incidence of exudative effusion was found to be more in ascitic fluid compared to pleural and pericardial fluid.
- Among the patients of exudative ascitic fluid, pleural fluid and pericardial fluid, uremic etiology was found to be the most common followed by tubercular etiology.
- Recurrent paracentesis is the leading cause for bacterial peritonitis.
- The reasons of no improvement seen in some of the patients in my study i.e. the CKD patients are already immunocompromised and probably had the inadequate dose of hemodialysis and ultrafiltration, poor nutrition and poor compliance to ATT.

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