IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Assessing The Risk Factors, Complications Associated With Hemodialysis Procedure And Its Management In Ckd Patients In A Tertiary Care Hospital

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Abstract: This prospective observational study aimed to assess the risk factors, complications, and their management during hemodialysis in chronic kidney disease (CKD) patients. Conducted at Government General Hospital, Kurnool, the study involved 120 patients, with hypertension being the most common risk factor. Anemia, shortness of breath, hypoglycemia, hypotension, and muscle cramps were most commonly seen complications. Headache, vomitings, infections, and chest pain were less commonly seen complications in this study. Management included erythropoietin injections, oxygen inhalation, antiemetics and other symptomatic treatment. The study highlights the importance of addressing complications and optimizing hemodialysis to improve patient outcomes in CKD.

Keywords - Chronic kidney disease, Hemodialysis, Complications and Management.

I.INTRODUCTION

Chronic Kidney Disease (CKD) is a progressive condition where the kidneys lose their ability to filter waste and excess fluids from the blood, leading to kidney failure over time. CKD can be caused by various factors, such as diabetes, hypertension, and genetic conditions, and often presents with symptoms like fatigue, swelling, and changes in urine output. As CKD advances, patients may require dialysis, a medical procedure that artificially removes waste products and excess fluids from the blood when the kidneys are no longer able to perform this function.(1) . Hemodialysis, the most common type, involves the use of a machine and a filter, called a dialyzer, to cleanse the blood. During the procedure, blood is drawn from the body, cleaned in the machine, and then returned. (2) While dialysis can effectively manage the symptoms of kidney failure

and improve quality of life, it comes with risks and complications, including anemia, hypotension, and infections.[3] Regular monitoring and proper management of these complications are crucial to ensuring the well-being of patients undergoing dialysis.

MDRD formula for calculation of GFR : [4]

GFR in males = 175 x ([serum creatinine] – 1.154) x ([age]- 0.2.3) x (0.742)

GFR in females = 175 x ([serum creatinine] - 1.154) x ([age] – 0.203)

2.NEED OF THE STUDY.

The need for this study is critical due to the increasing global prevalence of chronic kidney disease (CKD) and its progression to end-stage renal disease, often requiring hemodialysis. As CKD patients undergo dialysis to maintain life, understanding the associated risks and complications becomes essential for optimizing treatment and improving patient outcomes. Hemodialysis, while lifesaving, can lead to complications like anemia, hypotension, infections, and muscle cramps, which significantly affect patient health and quality of life. Identifying these complications early and establishing effective management protocols can help reduce their severity and frequency. Additionally, recognizing the risk factors of CKD, such as hypertension and diabetes, allows for targeted interventions that can slow disease progression. This study will provide valuable insights into the clinical management of hemodialysis, ensuring better care for CKD patients. By improving dialysis procedures and complication management, the study aims to enhance patient survival rates, reduce hospitalizations, and improve overall quality of life for those undergoing chronic treatment.

3.METHODOLOGY

3.1Population and Sample

The population for this study consists of patients diagnosed with chronic kidney disease (CKD) who are undergoing hemodialysis treatment at Government General Hospital, Kurnool. These individuals represent a diverse group of patients with varying stages of CKD, risk factors, and complications associated with dialysis procedures.

The sample size for this study is 120 patients who are receiving hemodialysis at the hospital. This sample is selected to assess the risk factors, complications, and management strategies in CKD patients undergoing the hemodialysis procedure. The selected sample provides a representation of the CKD patient population at the study site.

3.2 Source of Data

Data was collected from those patients who are admitted in a tertiary care hospital in the nephrology department who are undergoing Hemodialysis procedure.

3.3 Study period

The study was conducted over a period of six months.

3.4 Inclusion and Exclusion criteria

Inclusion Criteria

- All patients diagnosed with CKD are included.
- All the patients of either sex aged above 18 years would be included.
- Patients undergoing hemodialysis for more than 3 times a week, 3-5 hours schedule are included.

Exclusion Criteria

- Patient’ s who did not sign to consent form are excluded from the study
- Patient’ s below 18 years are excluded.
- Patient’ s with pregnancy and lactation.
- Patient’ s who are not co-operative.

4. RESULTS

A prospective observational study was conducted for six months in a tertiary care hospital in department of nephrology at Government General Hospital, Kurnool.

A total of 120 subjects were studied who comes under inclusive criteria.

4.1Gender wise distribution of subjects

In our study, a total of 120 subjects were collected among them 56 are Males and 64 are Females.

Table 4.11 Representing gender wise distribution

Gender	Frequency (n=120)	Percentage (%)
Males	56	47 %
Females	64	53 %

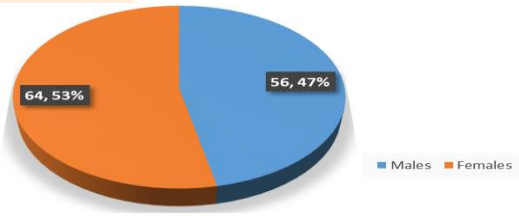

Figure 4.1 Gender wise distribution of subjects

4.2 Age Wise Distribution:

In this study, the age group range of 31-50 years were most affected with the percentage of 45 least affected age group is between 18-30 years.

Table 4.2 Representing distribution of ages

Age	Frequency (n=120)		Percentage (%)
	Males	Females	
18-30	11	10	17.5
31-50	28	26	45
51-80	17	28	37.5

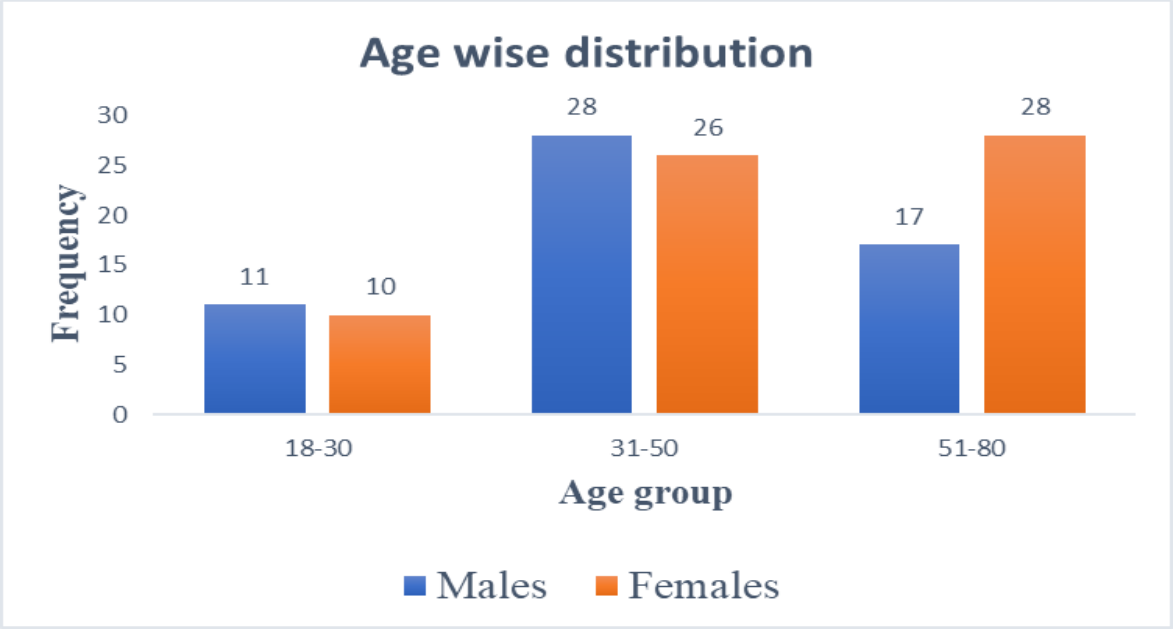

Figure 4.2 Age Wise Distribution of Disease Among Subjects

4.3 Risk Factors

In this study, Hypertension is the major risk factor i.e., 30% (36), followed by type2 diabetes 24% (29).

Table 4.13 Distribution of risk factors in study population

S. No	Risk Factors	Males	Females	Total	Percentage (%)
1	Hypertension	17	19	36	30
2	Type2 Diabetes	15	14	29	24
3	Both HTN and Type2 DM	13	14	27	23
4	NSAID Abuse	5	7	12	10
5	Age	4	6	10	8
6	Auto Immune Disorder	1	3	4	3
7	Renal Stones	1	1	2	2

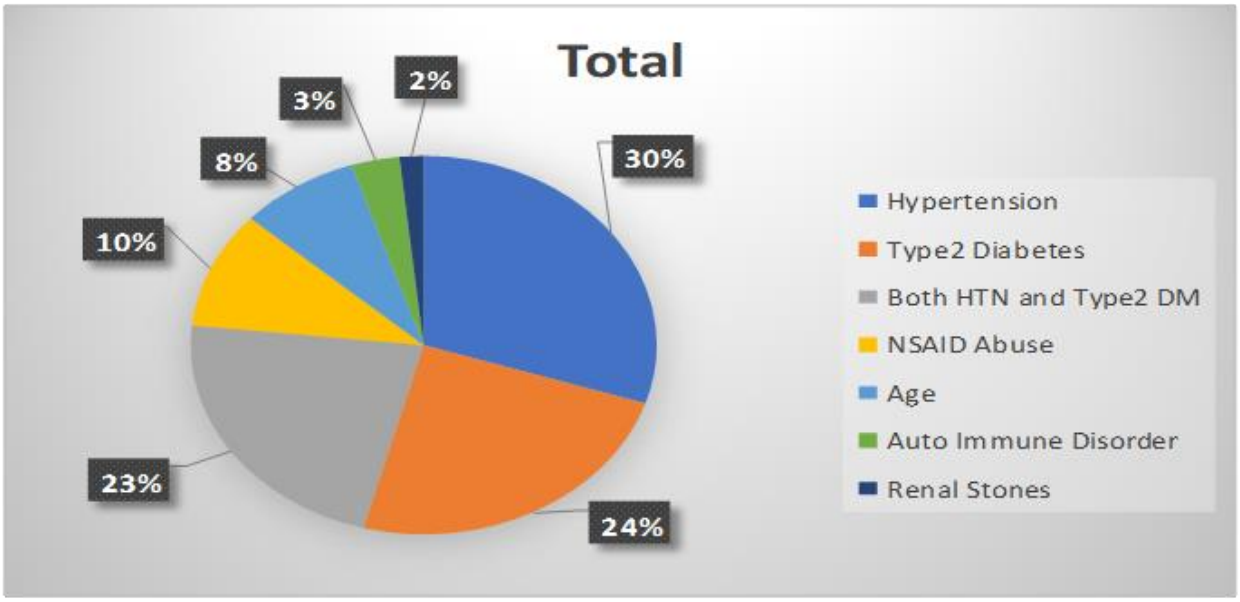

Figure 4.3 Representing risk factors

4.4 Population with and without Complications of Hemodialysis

In our study total 120 patients are included among them 98 patients were associated with complications of hemodialysis procedure, and 22 were not associated with hemodialysis procedure.

Table 4.4 Data of Population Associated with Complications of Hemodialysis and without Complications of Hemodialysis

Members associated with Complications (n= 120)	Members not associated with Complications (n = 120)
98	22

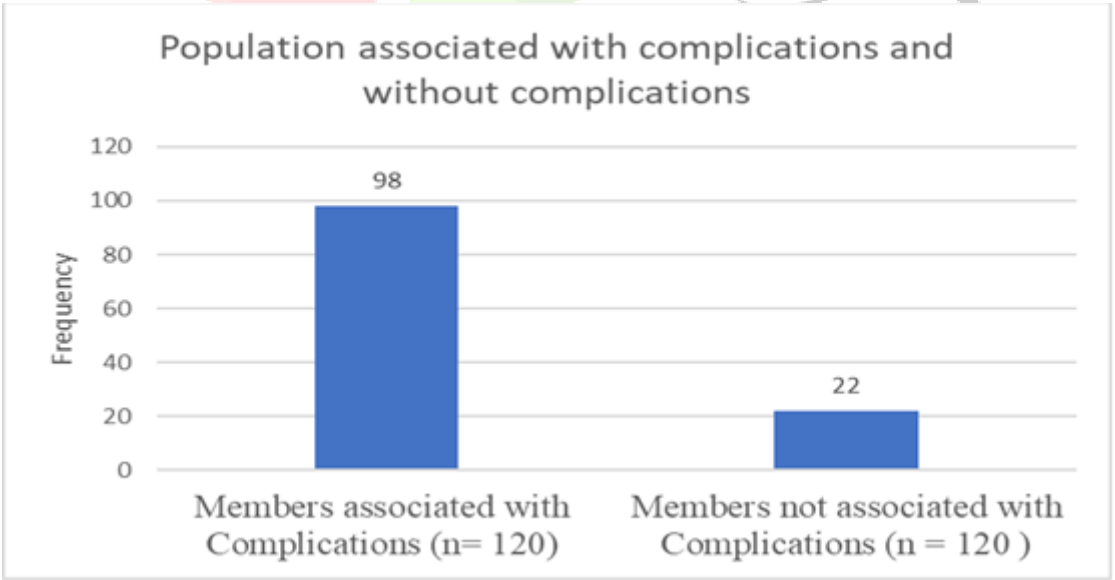

Figure 4.4 Population associated with and without complications

Table 4.5 Distribution of most commonly seen and less commonly seen Complications in Study Population

Most commonly seen complications	Less commonly seen complications
89	9

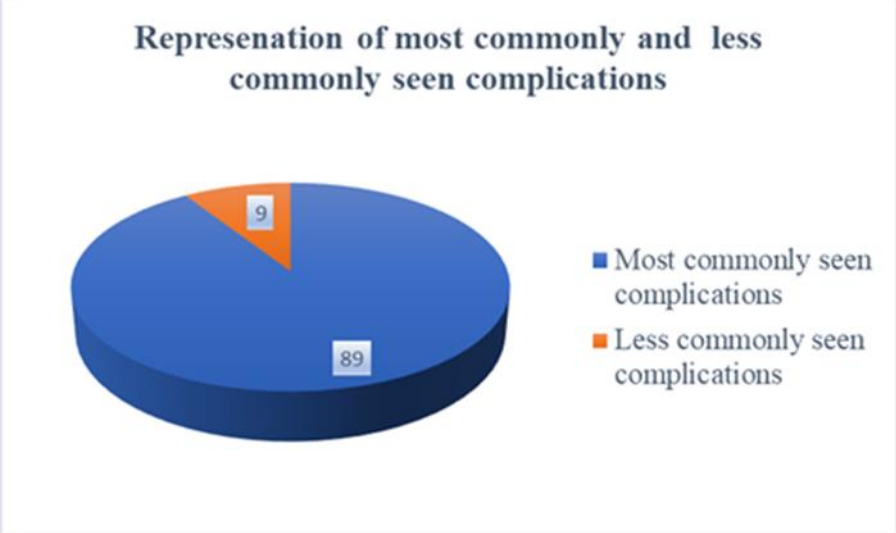

Figure 4.5 Most commonly and less commonly seen complications in Study Population

Table 4.6 Gender wise distributions of subjects with mostly seen complications associated with hemodialysis procedure

S. No	Mostly Seen Complications	Male	Female	Frequency (n=89)
1	Anemia and Shortness of breath	18	22	40
2	Hypo glycemia	14	10	24
3	Hypotension	5	6	11
4	Fever and chills	6	3	9
5	Muscle cramps	2	3	5

Anemia and shortness of breath: Among males, 18 individuals experienced anemia and shortness of breath, while 22 females reported the same complications. The frequency for this complication was 40 individuals, constituting 44.94% of the total occurrences.

Hypoglycemia: 14 males and 10 females experienced hypoglycemia, totaling 24 individuals. This complication accounted for 26 % of the total occurrences

Hypotension: Hypotension was observed in 5 males and 6 females, with a total frequency of 11 individuals, representing 12 % of the total occurrence.

Fever and chills: 6 males and 3 females reported fever and chills, summing up to 9 individuals. This complication accounted for 10 % of the total occurrences.

Muscle cramps: Among males, 2 individuals experienced muscle cramps, while 3 females reported the same complication. The total frequency for muscle cramps was 5 individuals, constituting 5% of the total occurrences.

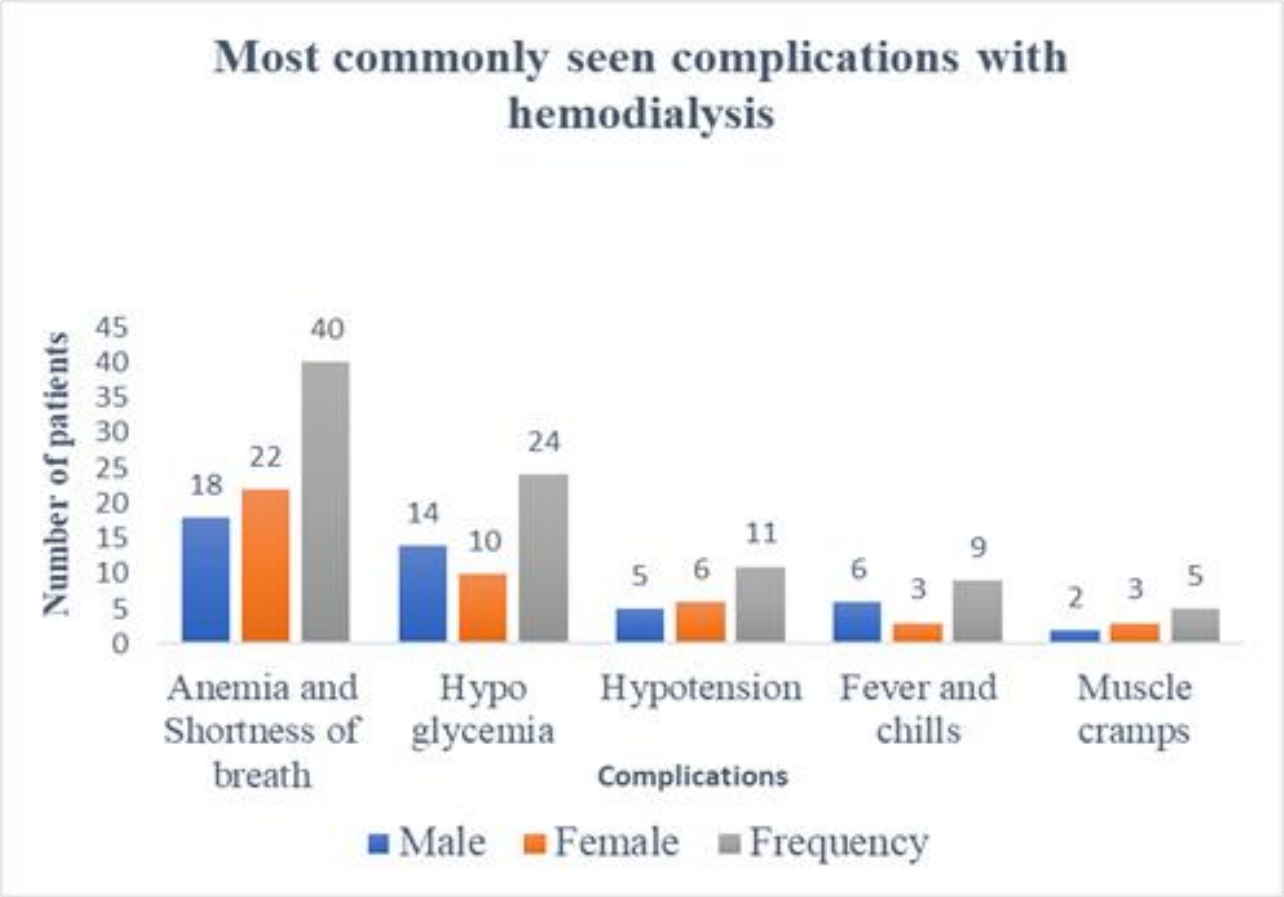

Figure 4.6 Mostly commonly seen complications associated with hemodialysis procedure

Table 4.7 Gender wise distribution of subjects with less commonly seen complications with hemodialysis procedure in Study Population

S. No	Less commonly seen complications	Male	Female	Frequency(n=9)	Percentage (%)
1	Head ache	3	1	4	44
2	Vomiting	1	2	3	33
3	Infections	1	0	1	11
4	Chest pain	0	1	1	11

Headache: Among males, 3 individuals reported headache, while only 1 female experienced this complication. The total frequency for headache was 4 individuals, constituting 44% of the total occurrences.

Vomitings: 1 male and 2 females experienced vomitings, totaling 3 individuals. This complication accounted for 33% of the total occurrences.

Infections: infections were reported by 1 male, while no females experienced this complication. the total frequency for infections was 1 individual, representing 11% of the total occurrences.

Chest pain: no males reported chest pain, while 1 female experienced this complication. The total frequency for chest pain was 1 individual, constituting 11% of the total occurrences.

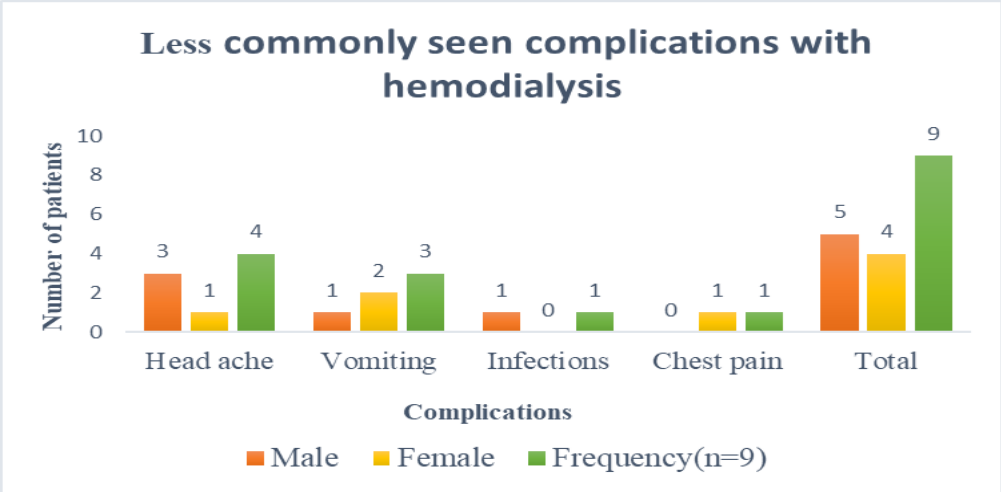

Figure 4.7 Less commonly seen complications associated with hemodialysis procedure

Table 4.8 Representing Management of complications

S. No	Complications	Drug	Dose	Route
1.	Hypoglycemia	25% dextrose	25 g	IV
2.	Hypotension	Normalsaline Noradrenaline	100 ml/hr 2mg – 4 mg	IV IV
3.	Fever Chills	Paracetamol Hydrocortisone	500 mg 500 mg (5ml)	PO IV
4.	Muscle cramps	Calcium gluconate L- carnitine	950 mg (10cc) 3g/day	IV IV
5.	Headache	paracetamol	500 mg	PO
6.	Vomitings	ondansetron	4 mg	IV
7.	Infections	Meropenem Ceftriaxone Amoxyclav	500 mg 1.5 gm 1.2 gm	IV IV IV
8.	Chest pain	Tramadol	50 mg – 100 mg	IV

DISCUSSION

- A prospective observational study was conducted for 6 months in a tertiary care hospital in the Department of Nephrology at Government General Hospital, Kurnool. A total of 120 subjects were studied who comes under inclusive criteria.
- In this present study 56 (46.6%) were males, and 52 (53.33%) were females compared to the Mahmood et.al study where males were 67% and females were 33% [5]. This shows female patients were more preponderant than male patients with CKD.
- In this study the age group range of 31-50 years was most affected with the percentage of 45 among them 26 were females and 28 were males compared with Mahmood. et.al study where 67 were males and 33 were females.
- In this study the major complications observed were anemia and SOB (44 %) and the least were muscle cramps (5.6 %). In the Mahmood et.al study major complications seen were fever and chills (37 %) and the least were chest pain (15 %).
- In Fadhi. F et.al study major complications seen were anemia (63%), and headache (25%). When compared to our study.
- In ali.m.et.al study major complications seen were hypotension (28.7%), and the least vomitings (11.7%) .[6]
- A major complication in our study is anemia. Anemia is due to reduced erythropoietin synthesis, blood loss during dialysis, and also through AV fistula that can be from aneurysms, stenosis, and subsequent ruptures.[7] In addition to anemia, shortness of breath is correlated as there is decreased oxygen carrying capacity of hemoglobin, this further leads to increased demand for oxygen. So, these can be treated with inj. Erythropoietin, Iron supplements and oxygen inhalation.
- Secondly majorly seen complication is hypoglycemia due to following reasons : [8]
  1.Loss of glucose from the blood along with waste products during hemodialysis
  2.Decrease in insulin clearance by the kidneys
  3.Diffusion of glucose into erythrocytes
- So, in our study the patients were given 25% dextrose to treat hypoglycemia.
- Followed by hypoglycemia, hypotension was seen due to Rapid ultrafiltration rate, decreased cardiac function and rapid changes in electrolytes [9]. For hypotension patients Normal Saline or nor-adrenaline has been given in our study.
- Followed by hypotension, muscle cramps were seen due to rapid fluid removal from the body can lead to shifts in the body' s fluid compartment, affecting muscle tissues and potentially triggering cramps. So, these cramps can be treated with calcium gluconate and L carnitine.
- Non pharmacological management plays a crucial role in the comprehensive care of hemodialysis patients, aiming to optimize their health outcomes and enhance their quality of life. Here are some key non pharmacological approaches commonly used in the management of hemodialysis patients.
- **Dietary Management:** [10]
- 1) **Control of Fluid intake:** Hemodialysis patients are often advised to limit fluid intake to prevent fluid overload and associated complications such as hypertension and pulmonary edema.
- **a) Sodium restriction:** Limiting dietary sodium intake helps control fluid balance and blood pressure.
- **b) Phosphorous and potassium control:** Dietary restrictions on phosphorous and potassium are essential to manage mineral and electrolyte imbalances common in kidney disease. [11]
- **c) Protein intake:** Adequate protein intake is important to maintain nutritional status, but it must be balanced to prevent excessive waste production. [12]
- **d) Caloric intake:** Monitoring caloric intake helps prevent malnutrition and supports overall health.
- **2) Vascular access care:**
- Proper care and maintenance of vascular access (e.g., arteriovenous fistula, graft, or central venous catheter) help prevent complications such as infection, thrombosis, and stenosis. [13]

CONCLUSION

- From the above study we conclude that we assessed the risk factors, complications associated with hemodialysis procedure in CKD Patients. The major risk factors were Hypertension, Hyperglycemia. In this study we also assessed the major complications associated with Hemodialysis in CKD patients are Anemia, shortness of breath and hypoglycaemia. In this study we incorporated some Pharmacological and Non-pharmacological management strategies with CKD can better navigate their condition and strive for improved health outcomes .

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