



# CHRONIC KIDNEY DISEASE; ACUTE INTRADIALYTIC COMPLICATIONS IN CHRONIC KIDNEY DISEASE PATIENTS ON HEMODIALYSIS.

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**ABSTRACT... Introduction:** Hemodialysis is a process of removal of waste products and toxic substances from the body using an extracorporeal system. During the procedure, lots of hemodynamic and metabolic changes occur in the body as a result of which patients undergoing hemodialysis may suffer from complications both acutely during or just after dialysis as well as in long term. **Objective:** To determine the frequencies of various acute intradialytic complications in our hemodialysis patients. **Study Design:** Cross sectional survey. **Setting:** Lahore General Hospital, Lahore. **Period:** 3 months from May 2017 to July 2017. **Method:** End stage renal disease patients on regular hemodialysis in the dialysis unit of a tertiary care hospital. A total of 81 patients were included in the study. Patients with acute renal failure and acute on chronic renal failure were excluded from the survey. **Results:** Common complications observed in our studied population included muscle cramps (70.7%), post dialysis fatigue (57.3%), back ache (56.1%), intradialytic shivering (57.3%), hypoglycemia (21.4%), hypotension (37.8%), hypertension (8.5%), headache (13.4%), vomiting (13.4%) and anaphylaxis in 2.4%. **Conclusion:** Hemodialysis is a complex procedure and can cause many complications most of which are not life threatening. With proper monitoring and immediate treatment these complications can be overcome without causing interruption in hemodialysis.

**Key words:** Hemodialysis, Intradialytic Complications.

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## INTRODUCTION

Chronic kidney disease is becoming a rising health problem worldwide including Pakistan.<sup>1</sup> Majority of patients of chronic kidney disease require hemodialysis, usually of 9 to 12 hours per week divided into sessions for their survival. Despite the advances made in hemodialysis equipments, dialysate water purification and dialyzers, still hemodialysis is associated with various complications though the clinical spectrum have change over decades.<sup>2</sup> The various complications observed during hemodialysis may be attributed to various technical problems often combined with patient's comorbidities.<sup>3</sup>

Based on some studies, the recorded complications of hemodialysis include hypotension (20-30%), painful muscle cramps (5 – 20%), nausea (5-20%), headache (5%), chest pain (2-5%), backache(2-15%) and fever (2%).<sup>4</sup> However, these statistics vary in different setups.<sup>5</sup>

This study was conducted to assess the frequency of various acute intradialytic complications in patients undergoing hemodialysis in our centre and the various attributable factors, so as to improve the quality of dialysis in our setup.

Acute complications of hemodialysis are defined as clinical signs and symptoms appearing during a hemodialysis session or within 24 hours after dialysis.<sup>6</sup> Acute complications of hemodialysis can be classified in the following manner

1) Complications associated with hemodialysis equipment; these can be i) Air embolism ii) Device related complications and problems in manual setup of machines and ii) Vascular access related complications.

Hemodialysis equipment works by taking blood from the body and passing it through the tubing where it is being made in contact with the

dialyzer which removes toxic substances such as urea, potassium and creatinine from blood and return it back after cleansing. During this process air embolism is the most fatal and feared complication. The symptoms of air embolism depends upon the position of patient, if patient is sitting neurological symptoms appear as embolus goes to the cerebral system and if patient is supine there will be respiratory symptoms. Errors in manual setup of machines such as poor fitting of tubing, temperature regulations, inadequate disinfection and venous needle coming loose. At some instances dialyzer reactions can also occur which may be type A anaphylactic reactions and type B non specific. A safe vascular access with adequate blood flow is required for HD which can be obtained by AV fistula and graft.

2) Cardiovascular complications during hemodialysis: - these include i) Hypotension ii) Hypertension iii) Arrhythmia iv) Myocardial infarction v) Pericarditis and v) Sudden cardiac death.

Intradialytic hypotension corresponds to less than 30mmHg drop of blood pressure in chronic hypotensive patients and more than 30mmHg drop in normotensive or hypertensive patients. Causes may include excessive interdialytic weight gain, autonomic neuropathy, on hypertensive medications, intradialytic food intake, high ultra-filtration rate, electrolyte abnormalities and errors in calculation of dry weight. Hypertension during dialysis is associated with high blood volume which is adjusted by daily sodium intake, amount of urine and removing excess fluid through ultra-filtration. Arrhythmias and other ECG changes associated with dialysis have multi factorial causes. Pericarditis may be of two types uremic and Pericarditis associated with dialysis which occurs after the start of dialysis sessions. IHD, cardiomyopathies and rapid electrolyte changes may be the cause of MI and sudden cardiac death.

3) Neurological complications: - may consist of disequilibrium syndrome, headaches and cerebrovascular events. These may be due to renal failure and end stage renal disease or

dialysis itself.

4) Complications associated with antibiotic therapy: - which consist of heparin induced thrombocytopenia and bleeding diathesis.

5) Electrolyte imbalances: - Potassium, sodium and calcium imbalance may occur which can lead to other complications that are cardiovascular and neurological.

6) Hematological complications: - Hemolysis which may lead to acute hemolytic reaction syndrome and neutropenia are included in this category. Others include nausea, vomiting, itching and cramps.

## OBJECTIVES

To ascertain the frequency of various acute intradialytic complications undergoing hemodialysis in our dialysis unit and the various factors contributing it.

## STUDY DESIGN AND METHODS

A retrospective cross sectional study was conducted on 82 patients undergoing regular hemodialysis in dialysis unit of Lahore General Hospital through random sampling technique. Sampling technique is non-probability convenient sampling. Patients of acute renal failure and acute on chronic renal failure were excluded from the study. Data was analyzed using SPSS version 22.0

## RESULTS

A total of 82 patients undergoing hemodialysis were studied over a period of 3 months from may 2017 to july 2017; out of these 44 (53.7%) were males and 38 (46.3%) were females. All of these patients were diagnosed with end stage renal disease with different etiologies; the most common was diabetes (52.4%). Others included hypertension (37.8%), chronic interstitial nephritis (4.9%) and chronic glomerulonephritis (2.4%). Obstructive uropathy was also found to be an important cause in (2.4%) of studied population. Conventional hemodialysis machines were used in all these patients at dialysate and blood flow rate of 500ml/min and 250 to 300 ml/min respectively.

Out of these 82 patients, 70 patients (85.4%) were undergoing hemodialysis twice per week and 12 patients (14.6%) were on three times per week hemodialysis. The hemodialysis accesses in all of them were arteriovenous fistula.

The common complications seen in our studied patients during hemodialysis are shown in Table-I.

Among other complications, muscle cramps were reported in almost 70.7% patients during hemodialysis, hypoglycemia in 21.4% and intradialytic shivering in 57.3%.

Causes of ESRD

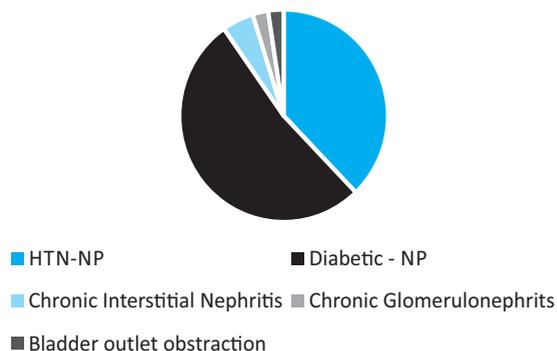


Figure-1

Dialysis Complications	Frequency	Percent
Hypotension	31	37.8
Hypertension	7	8.5
Headache	11	13.4
Vomiting	9	11.0
Pruritis	11	13.4
Anaphylaxis	2	2.4
Post dialysis fatigue	47	57.3
Back ache	46	56.1
Bleeding (from fistula)	29	35.4
Total	71	86.6

Table-I

P-value of comparison between hepatitis and complication is found to be 0.083, that means no co-relation was found between dialysis complications and hepatitis sero-positivity as seen in Table-II.

However, significant correlation was found between cases of ESRD and complications of dialysis. Refer to Table-III.

Dialysis Complications	Hepatitis				Total	p-value
	Hepatitis-B	Hepatitis-C	Both	No		
Hypotension	3 (9.7%)	12 (38.7%)	.2 (6.5%)	14 (45.2%)	31 (100.0%)	0.083
Hypertension	0 (0.0%)	2 (28.6%)	2 (28.6%)	3 (42.9%)	7 (100.0%)	
Headache	0 (0.0%)	4 (36.4%)	0 (0.0%)	7 (63.6%)	11 (100.0%)	
Vomiting	2 (22.2%)	4 (44.4%)	0 (0.0%)	3 (33.3%)	9 (100.0%)	
Pruritis	0 (0.0%)	9 (81.8%)	0 (0.0%)	2 (18.2%)	11 (100.0%)	
Anaphylaxis	0 (0.0%)	2 (100.0%)	0 (0.0%)	0 (0.0%)	2 (100.0%)	
Total	5 (7.0%)	33 (46.5%)	4 (5.6%)	29 (40.8%)	71 (100.0%)	

Table-II

Dialysis Complications	Cause of ESRD				Total	p-value
	HTN-NP	Diabetic-NP	Chronic Interstitial Nephritis	Chronic Glomerulonephritis		
Hypotension	13 (41.9%)	16 (51.6%)	0 (0.0%)	2 (6.5%)	31 (100.0%)	0.031
Hypertension	3 (42.9%)	2 (28.6%)	2 (28.6%)	0 (0.0%)	7 (100.0%)	
Headache	3 (27.3%)	8 (72.7%)	0 (0.0%)	0 (0.0%)	11 (100.0%)	
Vomiting	2 (22.2%)	7 (77.8%)	0 (0.0%)	0 (0.0%)	9 (100.0%)	
Pruritis	6 (54.5%)	5 (45.5%)	0 (0.0%)	0 (0.0%)	11 (100.0%)	
Anaphylaxis	0 (0.0%)	2 (100.0%)	0 (0.0%)	0 (0.0%)	2 (100.0%)	
Total	27 (38.0%)	40 (56.3%)	2 (2.8%)	2 (2.8%)	71 (100.0%)	

Table-III

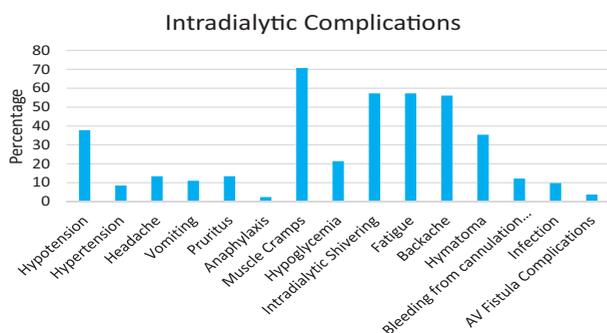


Figure-2

## DISCUSSION

In our study of 82 patients undergoing hemodialysis in Dialysis center of Lahore general hospital, muscle cramps was to be found as most common complication. 70.7% of patients complained of muscular cramping in body mainly in lower extremities. The cause may be getting below your dry weight and removing excessive volume rapidly (rapid volume contraction). Low concentration of sodium in dialyzer may lead to increase in removal of sodium from body and may cause cramping.<sup>14</sup> Intradialytic shivering is the second most common complaint effecting 57.3% of patients, which is not associated with fever or increased temperature. This may due to line related sepsis, hypotension, hypoglycemia and cold temperature dialysate which have a positive effect of reducing incidence of intradialytic hypotension but may lead to adverse thermal symptoms such as feel of cold or shivering.<sup>15</sup>

Fatigue in patients on maintenance hemodialysis is also a major complaint involving 57.3% of patients under study. Physiological, behavioral, treatments related and individual factors of patients may be related to symptoms of fatigue. These may include anemia, malnutrition, uremia, dialysis inadequacy, hyperparathyroidism, co-existing chronic illnesses, sleep disorders, depression and side effects of medications along with dietary malnourishment and fluid intake deficiency. Physical inactivity is also related to fatigue along with socio-demographic factors such as age, sex, race.<sup>10</sup> Backache is one of the problems associated with HD affecting 56.1% patients in our study. This can be ESRD associated

or merely due to long standing physical immobility, but chronic backache can be also a sign of more fatal disease that is osteomyelitis.<sup>17</sup>

Intradialytic hypotension (IDH) is affecting 37.8% of subjects in our study. The causes are numerous as listed above. IDH can be managed by properly assessing dry weight of patient and accordingly adjusting ultra-filtration rate, by decreasing dialysate temperature and giving intravenous normal saline and midodrine in resistant cases.<sup>8</sup> Hematoma formation at the site of AV fistula was found to be prevalent in 35.4% of the subjects. This may arise due to needle punctures during dialysis sessions.

Intradialytic hypoglycemia is another complications found in 21.4% of patients. Hypoglycemic episode during dialysis are more common in diabetic patients, as in our study the major cause of end stage renal disease was found to be diabetes mellitus type II (52.4%). Blood glucose level fluctuates more in diabetic patients with end stage renal disease and on dialysis. Due to this fluctuation therapeutic insulin excess occur in these patients. OHA's cause less risk of hypoglycemic episodes than patients on insulin.<sup>16</sup>

Headache and pruritis are two more complications effecting 13.4% of the subjects each. Although the pathophysiology of headache is not known but it might be associated with hypo- hypertension, serum electrolyte disturbances, pre and post dialytic BUN values and decreased serum osmolarity. Itching or pruritis may be associated to sensitivity to vascular access disinfecting solutions and needles or reactions to component of extracorporeal circuits or it can be simply due to patient being immobilized for several hours during the session and becoming more aware of their generalized pruritis.<sup>9</sup>

Other complications include Bleeding from cannulation site 12.2%, nausea and vomiting 9%, hypertension 7%, AV fistula complications 3.7% and anaphylaxis 2% of the subjects under study.

## CONCLUSION

Hemodialysis though is a major life saving

treatment modality however is associated with vivid complications. Most of these complications are not life threatening. A good patient care, proper monitoring during dialysis and strict vigilance with early detection and timely management may help in carrying hemodialysis without termination.

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AUTHORSHIP AND CONTRIBUTION DECLARATION

Sr. #	Author-s Full Name	Contribution to the paper	Author=s Signature
1	Tanveer Fatima	Data collection and article writing.	
2	Aurangzeb Afzal	Data collection and article writing.	
3	Sania Ashraf	Review of article.	