

# COMPLICATIONS DURING HEMODIALYSIS IN END STAGE RENAL DISEASE PATIENTS IN A TEACHING HOSPITAL

Atta Muhammad Khan<sup>1</sup>, Muhammad Abdur Rahman Afridi<sup>2</sup>, Muhammad Asghar<sup>3</sup>,  
Muhammad Ikram<sup>4</sup>, Riaz Muhammad<sup>5</sup>

<sup>1-3,5</sup> Department of Medicine,  
Lady Reading Hospital, Peshawar – Pakistan.

<sup>4</sup> Department of Nephrology,  
Lady Reading Hospital, Peshawar – Pakistan.

**Address for Correspondence:**  
**Dr. Muhammad Abdur Rahman Afridi**

Associate Professor,  
Department of Medicine, Lady Reading Hospital, Peshawar – Pakistan.

Email: rahmanafriidi@hotmail.com

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## ABSTRACT

**Objective:** To determine the frequency of complications during hemodialysis in patients with end stage renal disease in Lady Reading Hospital, Peshawar.

**Methodology:** A six months cross-sectional study of 219 end stage renal disease patients undergoing hemodialysis was conducted in the Departments of Medicine and Nephrology, Lady Reading Hospital, Peshawar, between October 2017 and March 2018. Relevant clinical and laboratory data pertaining to complications were collected and SPSS version 19 was used for data analysis.

**Results:** Out of 219 patients, 145 (66.21%) were males. The mean age of patients was  $55.8 \pm 7.67$  years (range 25 to 70 years). Complications were common in male patients (66.21%). During hemodialysis, the following complications were noticed; fatigue (80%); neuro-psychiatric complications include anxiety (60%), headache (58%), poor sleep (55%); infections like urinary tract infection (65%), central dialysis catheter infection (41.55%), HCV infection (16%), HBV infection (12%); gastrointestinal complications like deranged liver functions (58.4%), nausea (30%); various cardiovascular complications include pulmonary edema (60%), pericardial effusion (45%), hypertension (40%), sudden cardiac death (34%); hemodialysis equipment related complications (22%); and others like restless leg syndrome (32%) and anemia (20%).

**Conclusion:** Most of the end stage renal disease patients on hemodialysis present with one or more complications and the most frequent were fatigue and neuropsychiatric complications.

**Key Words:** End stage renal disease, Hemodialysis, Complications

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## INTRODUCTION

End stage renal disease (ESRD) is a common chronic disease with higher incidence and prevalence (10%) all over the world<sup>1</sup>. Hemodialysis (HD) is a kind of management that is commonly used for ESRD and 90.6% of patients having ESRD eventually need hemodialysis<sup>2</sup>. HD hampers the patient's normal life, limit the day to day regular activities and generally causes physical and psychological issues.

End stage renal disease patients on hemodialysis require some constrains and limitations e.g. diet issues, care of arteriovenous fistula site, frequent hospital visits, mood problems, fatigue and sedentary life related to ESRD<sup>3</sup>. Complications during hemodialysis are not very uncommon and it has negative repercussions on the patients' health as well as on the meagre resources of our health system. So by evaluating these complications we will be able to find out the need assessment

and prevent these complications and uplift our patient care. End stage renal disease is a complex disease which results in various complications like respiratory distress, sleep disturbance, depressive moods, fatigue, restless legs syndrome (RLS) and increased risk of peptic ulcer bleed<sup>4-6</sup>. ESRD patients undergoing hemodialysis have a high rates of complications especially cardiovascular morbidities like hypotension, hypertension, pericardial effusion, arrhythmias etc., affecting their quality of life and causing short life expectancy<sup>7</sup>. Hypertension is one of major vascular risk factors within patients on chronic dialysis. Cardiovascular accidents and sudden cardiac death are among the commonest cause of mortality of patients on hemodialysis<sup>8,9</sup>. Viral hepatitis is also one of the major complications in these patients, with hepatitis C as the more common one followed by hepatitis B infection. These patients have raised hepatic enzyme levels and it has been implicated in the pathogenesis of pruritus in uremic patients undergoing hemodialysis<sup>10,11</sup>.

Various psychosocial factors like anxiety, depression and low social support are common in these ESRD patients<sup>12</sup>; and have significant correlation with non-compliant behavior and low quality of life in hemodialysis patients. Apart from that, neurological complications decrease life quality and raise mortality<sup>13-15</sup>. Depression is one of the most common psychiatric illnesses in patients with ESRD and is related to high morbidity and mortality<sup>16</sup>. Depression has also been associated with increased risk of death, cardiovascular (CV) events and hospitalization in a significant number of these patients. Impaired standard of life has been described in these patients<sup>14,17</sup>.

End stage renal disease is on the rise in Pakistan because there is increased prevalence of diabetes mellitus, hypertension and other renal illnesses. Hemodialysis is frequently required in ESRD patients. Complications during hemodialysis are quite common and they have negative effects on the patients' health as well as on the health sector. Therefore, this cross sectional study was designed to analyze the different complications during hemodialysis in ESRD patients. By evaluating these complications, we will be able to determine its frequency and nature and will help in generation of local data. Moreover, relevant information will be available for caring physicians and will help in detection and prevention of these complications during hemodialysis which will ultimately help in improvement of patient care.

## METHODOLOGY

A six months descriptive cross-sectional study of 219 end stage renal disease patients was conducted in the Departments of Medicine and Nephrology, Lady Reading Hospital, Peshawar between October 2017 and March 2018. The sample size was calculated with prevalence (10%)<sup>1</sup>, margin of error (4%) and confidence interval (95%) using WHO Calculator. The patients were recruited through consecutive non-probability technique. All ESRD patients on hemodialysis with age between 25 to 70 years of either sex who were admitted in Medicine and Nephrology Departments in this institution and who gave informed written consent, were recruited for this study. Relevant data were gathered from the patient's as well as hospital records via a structured

questionnaire about complications during hemodialysis. Patients with acute renal injury requiring short time hemodialysis, ESRD patients who were on continuous ambulatory peritoneal dialysis (CAPD) or having kidney transplant and ESRD patients not on hemodialysis were excluded from the study. ESRD was operationally defined as CKD grade 5 kidney damage and/or glomerular filtration rate (GFR) <15 ml/min/1.73 m<sup>2</sup> for three months or more, regardless of cause. Hemodialysis was defined as a process where hemodialysis machine and a specialized filter known as an artificial kidney/ dialyzer are used to purify blood via an access to blood vessels usually in the arm. The Pittsburgh sleep quality index (PSQI) was used to assess individual's sleep quality and those with PSQI score more than 5 were grouped as having poor sleep while with PSQI score less than 5 as having good sleep. The Hamilton depression rating scale was utilized to assess neuropsychiatric problems<sup>17</sup>.

Different investigations like complete blood count, renal function tests, liver function tests, urinalysis, blood sugar level, ECG, echocardiography, x-ray chest, blood, urine & catheter culture and sensitivity, etc. were performed. Staff of the hemodialysis unit was taken on board and trained so that we can have proper case information and investigations record regarding ESRD patients. This study was approved by the Institutional Ethical Review Board (IRB). Informed consent was obtained from patients or their relatives. The data of this project was exclusively used for study purpose. High confidentiality and anonymity was ensured and met. The variables of interest of this study included various demographic variables as well as different complications of hemodialysis as given in Tables 1 & 2. SPSS 19 was used for statistical analysis and data were analyzed via t-test for numerical variables and chi square test for categorical variables. Data obtained were presented in the shape of tables.

## RESULTS

The results of our study indicated that 145 (66.21%) were males while the remaining 74 (33.79%) were females. The male to female ratio was nearly 2:1. Only 43 (19.63%) were below 40 years of age while 90 (41.1%) patients were above 60 years age, as shown in Table 1.

**Table 1: Age and gender of ESRD patients (n=219)**

Age Groups	Males	Females	Total
Less than 40 Years	29 (13.24%)	14 (6.39%)	43 (19.63%)
40-60 Years	52 (23.74%)	34 (15.53%)	86 (39.27%)
More than 60 Years	64 (29.23%)	26 (11.87%)	90 (41.10%)
Total	145 (66.21%)	74 (33.79%)	219 (100%)

**Table 2: Frequency of different complications during hemodialysis**

Variable	Frequency	Percentage
Neurological Complications	106	48.40%
Infections	91	41.55%
Respiratory Complications	77	35.16%
Miscellaneous Complications	69	31.51%
Cardiac Complications	65	29.68%
Blood Disorders	53	24.20%
Equipment related Complications	48	21.92%

**Table 3: Relative frequencies of different complications during hemodialysis**

Type of complications	Frequency (%)	Type of complications	Frequency (%)
Fatigue	175 (80%)	Skin Infections	66 (30%)
Urinary Tract Infection	142 (65%)	Chest Pain	65 (29.68%)
Pulmonary Edema	131 (60%)	Altered Sensorium	64 (29%)
Anxiety	131 (60%)	HD Equipment related Complications	48 (22%)
Deranged Liver Functions	128 (58.4%)	Arrhythmias	44 (20%)
Headache	127 (58%)	Anemia	44 (20%)
Poor Sleep	120 (55%)	Convulsions	35 (16%)
Tremors	106 (48.40%)	HCV Infection	35 (16%)
Pericardial Effusion	99 (45 %)	Vomiting	31 (14)%
Central Dialysis Catheter Infection	91 (41.55%)	Hypotension	26 (12)%
Hypertension	88 (40%)	HBV Infection	26 (12%)
Depression	88 (40%)	Heart Failure	20 (9%)
Pneumonia/LRTI	77 (35%)	Cholangitis/Pancreatitis	20 (9%)
Sudden Cardiac Death (SCD)	74 (34%)	Pulmonary Embolism	20 (9%)
Restless Leg Syndrome (RLS)	70 (32%)	Fainting Episodes	18 (8%)
Fluid Overload	66 (30%)	Myocardial Infarction	18 (8%)
Stroke	66(30%)	Reaction to Dialyzer/Drug	07 (3%)
Nausea	66 (30%)		

Fatigability was seen in 175 (80%) patients in our study. One hundred and twenty (55%) patients reported poor sleep quality defined as a global PSQI score >5. More than half (58.4%) of the patients had deranged liver functions. Depression was found in 40% of patients. Other common complications and their frequencies are mentioned in Table 2 and 3.

## DISCUSSION

From this study it is evident that frequency of complications in end stage renal disease patients was much more (80.37%) in patients with age more than 40 years as was reported by Yang et al<sup>18</sup> in their study. In this study, complications were more frequent in males (66.21%) and this was supported by previous study of Zhang et al<sup>19</sup>, showing greater than 50% prevalence in males.

Fatigue is one of the most commonly occurring complications in our population present in 80% in our study and is also revealed in another study which showed it to be 78.1%<sup>20</sup>. In a study done by Gulsum et al<sup>21</sup> on hemodialysis patients reported 29% skin infections and 8.5% cholangitis/pancreatitis. These findings were revealed and supported by our study which had 30% frequency of different skin infections and 9% cholangitis. In our study, 22% of ESRD patients had HD equipment related complications and this was supported by a study which had high prevalence rate of such complications associated with HD equipment<sup>21</sup>.

Urinary tract infection, central dialysis catheter infection, pneumonia and skin infections reported to be 65%, 41.55%, 35% and 30% respectively in our study, are in accordance with various international studies<sup>22,23</sup>. Pulmonary edema, pericardial effusion and fluid overload were seen in 60%, 45% and 30% of our patients as evident in some previous studies<sup>24</sup>. The reasons for these complications are paucity of hemodialysis due to poor social and insurance system, decreased local dialysis centers, poor ultrafiltration and less dialysis time due to high turnover.

In this study, neuro-psychiatric complications were among the most frequent complications including anxiety, headache, poor sleep, depression, stroke, altered sensorium, convulsions and faint episodes and their corresponding frequencies were 60%, 58%, 55%, 40%, 30%, 29%, 16% and 8% respectively. Similar results are shown in other studies as anxiety, headache, poor sleep, depression, stroke, altered sensorium, convulsions and faint episodes in 63.7%, 55.55%, 50.7%, 49.9%, 29.6%, 25.92%, 14.81% and 7.1% respectively<sup>25-29</sup>. The depression was higher in our study due to poor socioeconomic conditions and because most of our patients were elderly and not financially independent. The gastrointestinal complications like deranged liver functions, nau-

sea, vomiting, cholangitis and pancreatitis were present among 58.4%, 30%, 14% and 9% respectively and these were supported by other international studies showing nausea 28.3%, vomiting 11.7% and cholangitis 8.5%<sup>29,30</sup>. Anemia was present in 20% of our patients which is supported by a study showing 16.4% anemia in such patients<sup>31</sup>.

In our study various cardiac and cardiovascular complications included hypertension, sudden cardiac death, chest pain, arrhythmias, hypotension, heart failure, pulmonary embolism and myocardial infarction in 40%, 34%, 29.68%, 20%, 12%, 9%, 9% and 8% patients respectively. These findings are supported by various other studies revealing their frequencies to be sudden cardiac death 33%, hypotension 11.6%, heart failure 7.1%, pulmonary embolism 7.1% and myocardial infarction 7.1%<sup>29,32-34</sup>. The reasons for higher heart failure might be poorly controlled hypertension, less glycemic control and fewer hemodialysis sessions.

Restless leg syndrome, hemodialysis equipment related complications, HCV infection, HBV infection and reaction to dialyzer/drug were seen in 32%, 22%, 16%, 12% and 3% of patients in this study. These are supported by various other studies in which restless leg syndrome, HCV infection, HBV infection and reaction to dialyzer/drug are seen in 34.45%, 19.2%, 10.6% and 2.37% of patients respectively<sup>5,10,35</sup>. In our study, there was high prevalence of HCV and HBV infections i.e. 16% and 12% respectively. It was supported by different international studies reporting prevalence of HBV and HCV infections to be 10.6% & 11.5%<sup>7</sup>; and 19.2% & 21% respectively in dialysis dependent patients of ESRD<sup>36</sup>.

This study results revealed that 35% ESRD patients undergoing hemodialysis were suffering from respiratory tract infections, while in a Turkish study it was reported as 12.8%<sup>21</sup>. The reason for high respiratory complications is paucity of hemodialysis due to poverty of patients, less local dialysis facilities, poor ultrafiltration and less dialysis time due to high turnover.

## LIMITATIONS

There were some limitations of this study as it consists of limited numbers of patients for limited time from one health center, therefore we need a multi-centric study with increased number of patients for long duration for detailed assessment and definite conclusion.

## CONCLUSION

Most end stage renal disease patients on hemodialysis had one or more complications and the most frequent were fatigue and neuropsychiatric complications. Common neurological complications like headache, stroke, seizures, altered sensorium were observed more frequently.

## RECOMMENDATIONS

A multidisciplinary approach need to be adopted by including different departments e.g. neurology, psychiatry, cardiology, pulmonology, infection and hematology, to address these complications more timely and effectively.

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#### CONTRIBUTORS

AMK conceived the idea, planned the study and drafted the manuscript. RM, MA and MI helped acquisition of data and did statistical analysis. MARA supervised the study and critically revised the manuscript. All authors contributed significantly to the submitted manuscript.