

**EVALUATION OF MAJOR COMPLICATIONS; PRE & POST HEMODIALYSIS IN PAKISTANI POPULATION**Muhammad Nadeem^{1*}, Muhammad Hanif² and Javeid Iqbal¹¹Department of Pharmacology, Faculty of Pharmacy, Hamdard University, Karachi²Department of Pharmaceutics, Faculty of Pharmacy, Hamdard University, Karachi, Pakistan***Corresponding author e-mail:** nadeem_d30@yahoo.com, muhammadhanif14@yahoo.com, drjaveidiqbal@hotmail.com**ABSTRACT**

The commonly used renal replacement therapy for the end stage renal disease (ESRD) is the maintenance dialysis and kidney transplantation. The objective of the study was to evaluate and determine the frequency of different complications during and after haemodialysis in patients having ESRD. A patient having approaches for the renal transplantation is the gold standard of treatment. The maintenance haemodialysis is the substitute for the proper kidney functions. On one hand, it is blessing for renal failure patients, while on other hand, complications may occurs during and after the process of hemodialysis. Some are inherent side effects of the normal extra corporeal circuit, some results from technical errors, & yet others are due to abnormal reactions during the dialysis procedure. This prospective and observational study was conducted at two different public and private hospitals of Karachi, Pakistan. Patients were selected from the lists of regular hemodialysis patients during the period of August, 2011 to April, 2012. The most frequently observed complications were cardiovascular system (CVS). These complications like hypotension & arrhythmia were at the top with frequency of 79.3%. The gastrointestinal (GIT) complications like nausea, vomiting abdominal pain followed the CVS complication in order of frequency. There is a need for development of effective strategies to prevent gastrointestinal bleeding in patients on hemodialysis who use Nonsteroidal anti-inflammatory drugs (NSAIDs). These complications may be decreased by taking some measures such as premedication of hemodialysis, well trained dialysis machine operators, latest technology dialysis machines, full monitoring during the process of dialysis and to improve the socioeconomic conditions of the patients so as to reduce the post dialysis problems such as infections at the site of catheter.

Keywords: Renal failure, Haemodialysis complications and their management, Hypotension, arrhythmias.**INTRODUCTION**

Chronic renal failure may be defined as a glomerular filtration rate (GFR) below 30 ml per minute^[1]. Symptoms and complications of uremia often occur when GFR is less than 15 ml per minute. The number of patients with chronic renal failure in Pakistan is continuously increasing with an estimated annual incidence of > 100 new cases of end-stage renal disease (ESRD) per million populations^[2] Patients with end stage renal disease required the replacement treatment. This can be provided by maintenance haemodialysis, peritoneal dialysis or kidney

transplantation. In Europe, over 450 per million populations are given replacement treatment for ESRD. Only about 30% of these patients undergo renal transplantation, which is considered as the gold standard of renal replacement therapy^[3]. The dialysis is only a part of end stage renal management because it cannot replace all the improvement functions of kidney. During haemodialysis, the patient may develop complications. The most common complications during dialysis are, in descending order of frequency as; Hypotension (20-30%), Cramps (5-20%), Nausea & vomiting (5-15%),

Headache (5%), Chest pain (2-5%), Back pain (2-5%) and Fever & chills (<1%).^[4]

Despite the substantial progress made in dialysis technology, cardiovascular problems remain the single most common cause of death in chronic dialysis patients^[5]. Nearly half of deaths on maintenance haemodialysis (HD) are attributed to myocardial infarction, cardiac arrest, hypotension and other cardiac reasons^[5, 6]. In fact, among chronic dialysis patients, the major prevalence of diabetes, anemia, hyperparathyroidism and hypertension favors structural heart diseases^[3].

Complications of hemodialysis can be divided into three major groups;

1. Treatment-related medical complications; these (in order of frequency) include hypotension, muscle cramps, nausea, vomiting, flushing of face, headache, increased pruritus, chest pain, fever, and chills.
2. Machine-related complications; these complications are due to accidents or failure of safety mechanisms of hemodialysis treatment. These include air embolism, hemolysis, hyperthermia or hypothermia, blood loss, and conductivity problems and;
3. Vascular access related complications which include cuffed venous catheters (which causes infections) and catheter related thrombosis.

Despite so much advancement in dialysis technique, patients of ESRD on maintenance hemodialysis have annual mortality of 10 % which is due to only cardiovascular diseases as congestive heart failure, acute myocardial infarction responsible for 50 % of deaths, cardiac arrhythmias especially ventricular arrhythmias^[7-13]. Another important complication of hemodialysis is the acute hypotension which occurs with frequency of about upto one third of hemodialysis patients^[14-17].

The main objective of this study was to evaluate the major causes of the dialysis before and after the procedure and to find out that which problem is at highest frequency.

MATERIAL AND METHOD

Patient population: This multicentre prospective and observational study consists of 160 patients (about 2260 dialysis shifts) and was conducted at nephrology & urology ward of Jinnah post Graduate medical centre (JPMC) and The Kidney Centre Hospital (A Postgraduate Training Institute (PGTI) Karachi, Pakistan.

Inclusion and Exclusion criteria: All patients, who were regular hemodialysis patient, who were with end stage renal disease, were included in this study. Those patients, who had Diabetes, cardiovascular diseases, hepatitis, neoplasm, pregnant, HIV and acute renal failure were excluded from the study.

Age and Sex distribution: One hundred and sixty patient selected for the study was comprises of 128 (80%) females and 32(20%) males as shown in Figure 1. Mean ages of selected patients were 34.5 ± 5 years. All selected patients were divided into different age groups; 2 males and 1 female was in age group of 10-19 years, only 7 females were in age group of 20-29 years. In age group 30-39, 4 males and 29 females were included, 11 males and 43 females were in age group 40-49 years, 9 males and 38 females were at the age of 50-59 while remaining 6 males and 10 females were at the age of 60-69 years which are shown as in Figure 2.

Data collection: All patients' data was collected who were haemodialyzed for maintenance dialysis from August, 2011 to April, 2012. Data was collected by taking detailed interviews from patients during haemodialysis for the symptoms occurring and thorough physical examination specifically oriented for physical signs of complications of hemodialysis. The interviews were also conducted from their relatives to know further about the post complications of dialysis. Data was also collected from the patient medical record. The symptoms and complications were hypotension, arrhythmias, vomiting, shivering, cramps, fits, dialysis disequilibrium, headache, bleeding, air embolism, nausea, septicemia, breathlessness, chest pain, itching, fever, haematemesis and clotting blood in tubing/dialyzer.

Investigations: Laboratory investigations were also performed such as, chest x-rays, electrocardiogram (ECG) for blood pressure measurement, with reference to monitor and confirm the complications accordingly and ultrasound (Doppler technology) for detection of air bubbles in the blood.

Analysis of Data: Data was analyzed by using IBM SPSS Statistics-19 and Microsoft Excel, 2007, to determine frequencies and percentage of complications of all patients.

RESULT AND DISCUSSION

Demographic Data: Patients were haemodialyzed from August, 2011 to April, 2012. One hundred and Sixty patients were selected; out of them, 128 were

females & 32 were males. The demographic data of patients are given in Figure 1. Major renal replacement therapy is haemodialysis worldwide for management of ESRD^[16] It is either sole replacement therapy or prior to renal transplantation. European studies estimate that there were 1.2 million dialysis patients worldwide in 2005 based on average annual growth rate of 6 %, there were now 1.6 million dialysis patients. The haemodialysis services are offered through social welfare department or on payment basis at Jinnah post Graduate medical centre and The Kidney Centre hospital (PGTI) Karachi, Pakistan.

The patients are haemodialyzed twice/thrice a week for maintenance dialysis and dialysis duration is 4 hours, so 8-12 hours/week. While patients have improved quality of life with maintenance haemodialysis, it is also accompanied with large number of complications which occurs during and after hemodialysis. In this study the complications of the haemodialysis occurred in 79.3% of the patients, either a major or a minor one. The CVS complications were at the top with 79.3% of the patients. The most common CVS complication was hypotension 53.7% of the dialyzed patients, which is in line to that observed by András Tislér, Katalin Akócsi et al. at Semmelweis University Budapest, Hungary^[17] and by Donauer J et al. The frequency of arrhythmia was about 25.6%.

This study pointed out that Features of the dialysis sessions complicated by DH seem to be similar between patients with fDH and oDH, while patient characteristics such as older age, renal diagnosis other than glomerulonephritis, higher serum phosphorus levels, use of nitrates, and lack of use of calcium channel blockers are significantly and independently associated with fDH. The frequency of cardiac arrhythmias is about 25.6%. Cardiac arrhythmias are frequently associated with haemodialysis and have been reported to be seen in some series among 33% of the patients^[18]. These appeared to occur mostly after the first three hours of dialysis. Various risk factors predisposing dialysis patients to arrhythmias have been identified including rapid electrolyte and fluid shifts, acid base alterations, alteration in parathyroid and calcium metabolism, reduced oxygen saturation levels and changes in erythrocytes potassium levels^[18].

The commonly observed GIT related complications during haemodialysis are nausea & vomiting, abdominal pain 54.92% of the patients had vomiting during or after dialysis. These results are comparable

to the results of the study conducted by David and Cambi^[19]. Heparinization during haemodialysis can precipitate upper gastrointestinal bleeding responsible for haematemesis, though it is not a very common problem. In this study only one patient experienced the upper GI bleeding. International data is also documenting the low incidence of haematemesis as the complication of maintenance haemodialysis^[20].

Headache, muscular cramps, confusion were the neurological complications observed 20.6% of patients. This contrast is due to the short duration of maintenance dialysis in this study (6 months) as compared to international data in which patients were on maintenance haemodialysis for the period of more than 5 years. Benna P et al.^[21] All have examined the momentary acute neurological complications arising in the course of hemodialysis in 103 patients with chronic renal failure (13,969 sessions of hemodialysis). The shivering and fever were the other common recorded complications of haemodialysis. These were observed in frequency of 5.6% and 11.8% respectively.

CONCLUSION

The results of this study revealed a very elevated frequency of the complications associated with maintenance haemodialysis. The CVS complications like hypotension & arrhythmia were at the top with frequency of 79.3%. The GIT complications like nausea, vomiting abdominal pain followed the CVS complication in decreasing order of frequency. The other major proportion of complications was Hematological complications; these were bleeding & clotting. The proper work-up of the patients prior to institution of maintenance haemodialysis and appropriate premedicine may prevent or decrease the frequency of these complications, which require another study for pathogenesis of these complications. Furthermore, the improvement in socioeconomical condition may lessen the complications especially catheter related problems.

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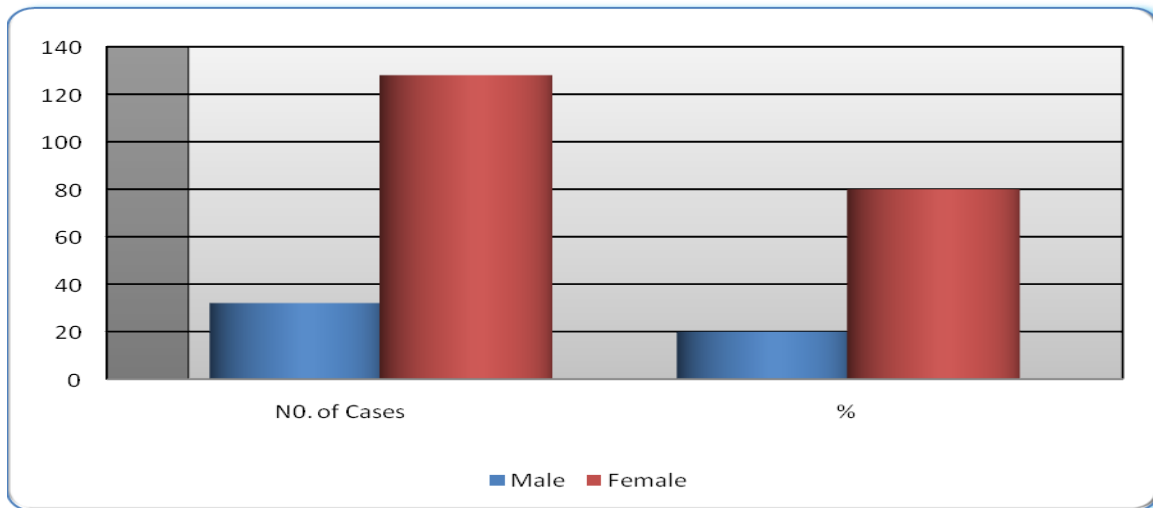


Figure 1: Demographic Data of patients

Table I: Ages and Sex Distribution

Age (Years)	Male	Female	Total
10-19	5	8	13 (8.1%)
20-29	2	12	14 (8.7%)
30-39	6	26	32 (20%)
40-49	7	42	49 (30%)
50-59	6	27	33 (20%)
60-69	2	17	19 (12%)

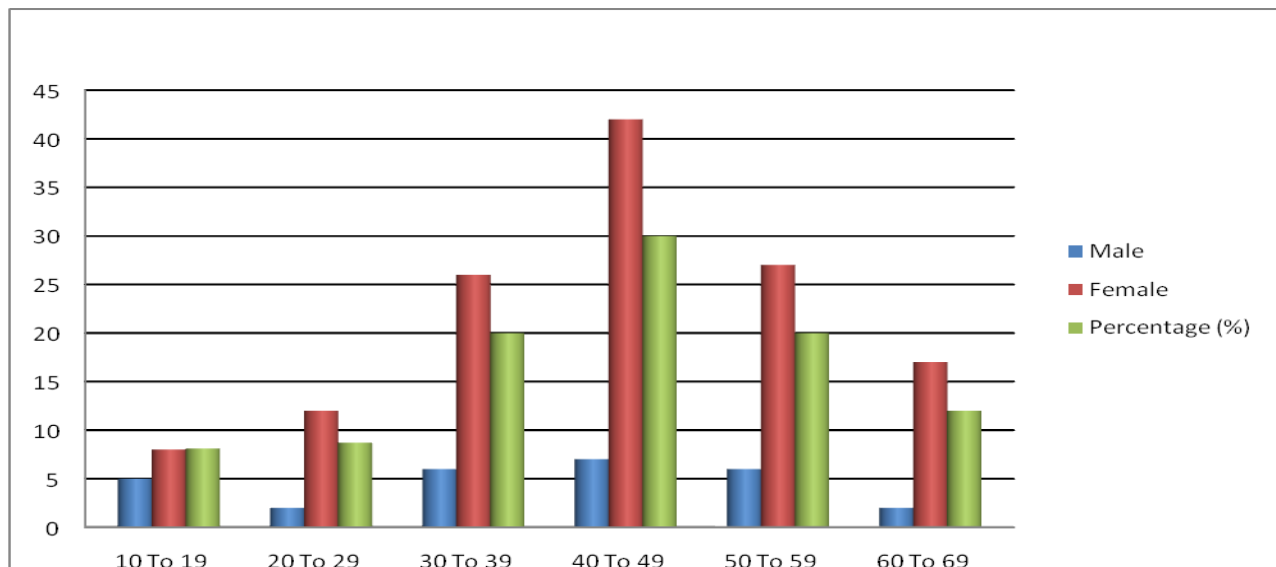


Figure 2: Ages and Sex Distribution

Table II: CVS complications

Complications	Male	Female	Total
Hypotension	14	72	86 (53.7%)
Arrhythmia	4	37	41 (25.6%)
Total	18	109	127 (79.3%)

Table III: Neurological Complications

Complications	Male	Female	Total
Headache	6	6	12 (7.5%)
Muscular Cramps	3	9	12 (7.5%)
Confusion	3	6	9 (5.6%)

Table IV: GIT. Complications

Complications	Male	Females	Total
Nausea & vomiting	7	39	45 (28.12%)
Abdominal Pain	13	23	36 (22.5%)
Haematemesis	3	4	7 (4.3%)

Table V: Vascular access Complications

Complications	Male	Female	Total
Septicemia	7	19	26 (16.2%)
Swelling	2	6	8 (5%)

Table VI : Hematological Complications

Complications	Male	Female	Total
Bleeding	3	6	9 (5.6%)
Clotting diathesis	3	8	11 (6.8%)

Table VII: Miscellaneous complications

Complications	Male	Female	Total
Shivering	6	3	9 (5.6%)
Fever	5	14	19 (11.8%)

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