Original Article

Clinical Characteristics and Outcomes of Hemodialysis in a New Center in Northern Nigeria

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Abstract

Background: Hemodialysis is the most common renal replacement therapy (RRT) modality in Africa and few countries enjoy reimbursement from the government to fund it. Africa contributes <10% of the total RRT patients worldwide this is mainly due to high cost. **Aims and Objectives:** We aimed to review the clinical characteristics and outcomes of patients requiring hemodialysis in our center over a 7 years period, to highlight the enormous challenges encountered. **Materials and Methods:** This is a retrospective study of patients aged 15 years and above that was seen between April 2010 and March 2017 at the Hemodialysis unit of Abubakar Tafawa Balewa University Teaching Hospital. Information was extracted from the patient's case folders and dialysis charts. **Results:** In total, 226 patients had hemodialysis over the period, 124 (54.9%) were male and 102 (49.1%) were female. Sixty-one (27%) patients had acute kidney injury (AKI), 143 (63.3%) had chronic kidney disease (CKD), whereas 22 (9.7%) had acute-on-CKD. A total of 2215 sessions of hemodialysis were done in the period, of which 782 (35.3%) were for AKI and 469 (21.2%) for acute on CKD. A total of 138 (60.6%) patients were discharged and 58 deaths were recorded. **Conclusion:** Although there is rapid proliferation of hemodialysis facilities in the country, many patients could not afford adequate hemodialysis. Inadequate dialysis due to finances was the main cause of death in these category of patients.

Keywords: Bauchi, clinical characteristics, hemodialysis, Northern Nigeria, outcomes

Introduction

The prevalence of all stages of chronic kidney disease (CKD) worldwide was 13.4%, whereas stages 3–5 CKD was 10.6% in the period 2000–2014.[1] With the continuing rise in prevalence and incidence, CKD has now become a significant public health problem.

This increase in prevalence is mainly due to the rising incidence of hypertension and diabetes. Overall, CKD mortality has increased by 31.7% over the past 10 years, making it one of the fastest rising major causes of death, alongside diabetes and dementia.[2] The global burden of disease study estimated that there were about 1.2 million deaths attributable to CKD in 2016, with 82% of years of life lost.[3]

The prevalence of CKD stages 1–5 range from 10.1% to 15.8% in the entire African continent; however, the prevalence was higher in sub-Saharan Africa and among certain high-risk groups such as hypertension (34.5%) and diabetes (24.7%).[4,5] Hemodialysis is the most common renal replacement therapy (RRT) modality in Africa and few countries enjoy reimbursement from government to fund RRT services.[6] There has been an upsurge of hemodialysis centers in countries like Nigeria, both in private and public hospitals, which are mostly concentrated in urban areas. Despite this seeming proliferation of hemodialysis centers, many end-stage renal disease (ESRD) patients could not afford the optimum dose of hemodialysis in the country.[7]

Objectives

This is 7 years review of the clinical characteristics and outcomes of patients requiring Hemodialysis at Abubakar Tafawa Balewa University Teaching Hospital.

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Methods

This is a retrospective study of all patients aged 15 years and above that were seen at the Hemodialysis unit of Abubakar Tafawa Balewa University Teaching Hospital between April 2010 and March 2017. Ethical approval was granted by the research and ethics committee of the hospital. Information on patient's demography, clinical, and laboratory parameters were extracted from the patient's case folders with additional information on vascular access, duration, and frequency of dialysis extracted from dialysis charts.

The diagnosis of chronic glomerulonephritis was based on a history of progressive edema, hypertension, anemia, proteinuria, red cell casts, and bilaterally shrunken kidneys on ultrasound in young persons. Hypertensive nephrosclerosis was diagnosed based on history and clinical features of long-standing hypertension, and features of kidney disease.[8] Diagnosis of diabetic nephropathy was entertained in a known diabetic (≥5 years), with microalbuminuria or proteinuria, hypertension, azotemia, and normal or enlarged kidneys on ultrasound.

Obstructive uropathy was diagnosed on the basis of clinical features of obstruction, ultrasound features of hydronephrosis, and clinical and biochemical features of kidney disease. The diagnosis of acute kidney injury (AKI) was based on the Kidney Disease Improving Global Outcome (KDIGO) clinical practice guidelines for the diagnosis of AKI.[9] ESRD was diagnosed based on KDIGO 2012 clinical practice guidelines on the evaluation and management of CKD.[10]

Data were analyzed using the Statistical package for social sciences version 21 (SPSS V. 21 IBM corporations 2013). Continuous variables were presented as means ± standard deviation, whereas categorical variables were presented as percentages. Chi-square test was used to assess the association between categorical variables, while the Wilcoxon rank-sum test was used to assess the association of continuous nonnormally distributed variables. Value of $P = 0.05$ was considered significant.

Results

In total, 226 patients had hemodialysis over the 7 years, 124 (54.9%) were male and 102 (49.1%) were female with a male: female ratio of 1.2:1. Their mean age was 41.5 ± 16.25 years, 142 (62.8%) and 22 (10%) were aged <45 and >65 years, respectively. About half (59.3%) of the patients were of Hausa/Fulani ethnicity, and 23.5% were from Bauchi Local Government Area. Thirty-five (15.5%) were from neighboring states of Gombe, Plateau, Jigawa, Adamawa, and Taraba. Farming and trading constituted 14.2% and 6.6% of patient's occupation, respectively, whereas 8% were students. Table 1 summarizes the main clinical presentation of the patients.

Sixty-one (27%) patients comprising 31 males and 30 females had AKI, 143 (63.3%) comprising 77 males and 66 females had CKD, 22 (9.7%) had acute-on-CKD (AoCKD). In terms of presentation, patients with CKD presented with edema compared to AKI or AoCKD patients. Patients with CKD also presented with other symptoms such as nausea, vomiting, pruritus, and severe lethargy more often than either AKI or AoCKD patients. One hundred and thirty-four (73.2%) of the CKD patients had systolic BP >140 mmHg, whereas 131 (71.6%) had diastolic BP >90 mmHg, only 9 (36%) of AKI patients had systolic or diastolic BP >140 mmHg or 90 mmHg, respectively. This observation suggests that patients with CKD present late in the course of their illness with prominent and severe uremic symptoms and poor blood pressure control. This could have a major affect on survival.

Patients with CKD had more blood transfusion than AKI or AoCKD patients ($P = 0.003$). Only 2 of the CKD patients were on regular erythropoiesis stimulating agents. Table 2 compares some clinical and laboratory parameters between patients with CKD and AKI. Patients with CKD were significantly younger than AKI patients; likewise, serum urea was significantly higher in CKD patients. Figure 1 shows the causes of AKI among the study patients. Chronic glomerulonephritis was the cause of CKD in 78 (54.5%), while hypertension, diabetes, obstructive uropathy, and sickle cell nephropathy were the cause of CKD in 42 (29.3%), 10 (7%), 5 (3.5%), 5 (3.5%), and 3 (2.2%), respectively.

About 15% of the CKD patients had other comorbidities, which included hepatitis B and hepatitis C infection, deep venous thrombosis, and cerebrovascular disease seen in 6%, 4.9%, 2.7%, and 1.6%, respectively. Less than 5% of the patients with CKD had functional arteriovenous fistula (AVF);

Table 1: Clinical features in the patients

Features	*N* (%)
Body swelling	192 (85)
Nausea/vomiting	195 (85.5)
Pruritus	88 (39)
Lethargy	132 (58.4)
Hematuria	79 (34.9)
Proteinuria	145 (64.1)
Severe hypertension	159 (70.4)
Hypertensive encephalopathy	58 (25.6)
Uremic encephalopathy	60 (26.5)

Table 2: Comparing the clinical and biochemical features of CKD and AKI

Variables	CKD	AKI	*P*
Mean age (years)	39.7±14.7	49.5±17.6	0.003*
Systolic blood pressure (mmHg)	152±30	144±27	0.2
Diastolic blood pressure (mmHg)	94.8±18	88±12	0.07
Hemoglobin (g/dl)	7.3±1.7	7.5±2.1	0.5
Serum urea (mmol/L)	39.4±13	32.9±17.9	0.02*
Serum potassium (mmol/L)	5.2 ±1.2	4.9±1.2	0.2
Serum creatinine (μmol/L)	950±326	866±392	0.2

*=P<0.05 statistically significance

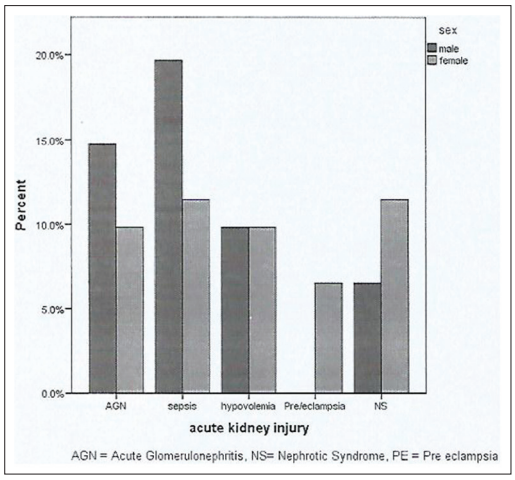

Figure 1: Causes of acute kidney injury

all others had hemodialysis via a subclavian or internal jugular catheter. All the AKI patients had dialysis through subclavian catheter (69.4%) and femoral catheter (30.6%). All patients with acute on CKD had dialysis through subclavian catheters except three who had femoral catheters.

During the period 2215 sessions of hemodialysis were done, of which 964 (43.5%) were for CKD, 782 (35.3%) were for AKI, and 469 (21%) were for acute on CKD. Most patients with AKI had 2–8 sessions of hemodialysis before recovery with a range of 2–14 sessions. Among the patients with CKD, 28 (19.1%) were on twice-weekly hemodialysis and 5 (3.4%) were on three times weekly dialysis. Twenty (13.7%) of the CKD patients were on dialysis for more than 12 weeks, while 35 (24%) were on dialysis for 9–12 weeks. Hyperkalemia was seen in 57 (40%) and 19 (30.6%) of CKD and AKI patients, respectively. Acidosis (defined as serum bicarbonate <18 mmol/L) was seen in about 46% of both AKI and CKD patients.

Complications during dialysis were recorded in 43 (19%) of the patients, of which intra-dialysis hypotension was seen in 11 (4.9%) of the patients. A total of 138 (60.6%) patients were discharged of which 82 (57.3%), 46 (75%), and 10 (45%) had CKD, AKI, and AoCKD, respectively. Two of the CKD patients went for transplant out of the country. Thirteen (8.9%) and 9 (14.5%) of the patients with CKD and AKI, respectively, were lost to follow-up. There were a total of 58 deaths, of which 46 (31.5%) had CKD, 8 (12.9%) had AKI, and 4 (22.2%) had AoCKD. Among the 46 AKI patients discharged 8 (17.4%) progressed to CKD, whereas 3 of the 10 patients with AoCKD also progressed to CKD.

Discussion

Sociodemographic features

The mean age of 41.5 ± 16.25 years was similar to many studies in Nigeria. Arogundade *et al*. reported the age range of hemodialysis patients in southwest Nigeria between 15 and 90 years,[11] similarly in 7 years' experience of hemodialysis in a south-south Nigeria, Alasia *et al*. reported the mean age of their patients as 46.2 ± 17.6 years.[12] In another study from the northwest Nigeria, the author reported a younger age of hemodialysis patients of 39.19 ± 16.9 years.[13] This is in contrast to the developed countries where hemodialysis patients were older, with a mean age of 61.1 ± 15.5 years.[14] This relatively younger age of patients from the developing nations has been attributed to higher infectious causes of CKD compared to developed nations where noncommunicable diseases are the major causes.[15]

This has significant economic implications to the country, where the most productive age group is affected. This places heavy financial burden and major psychological trauma to the family that are left impoverished by a lack of basic social amenities, education, and insecurity.

It is therefore not surprising that CKD patients' presentation to a health facility is rather late when less can be done to salvage the failing kidney. From this study, it is apparent that about a quarter of the patients presents in encephalopathy, in addition to mild uremic symptoms such as nausea/vomiting and lethargy. This is the typical presentation of patients in most hospitals in the developing world. For instance, Arogundade *et al*. while reviewing hemodialysis outcome in Ife observed that >60% of their patients presented with body swelling, and uremic symptoms.[11] Similarly, Alasia *et al*. in Port Harcourt found out that 85% of their patients presented in an unstable clinical state.[12]

Clinical characteristics

The situation is not different from other developing countries. In Asia, many patients receive dialysis only when uremia became overwhelming and/or life-threatening complications such as fluid overload, metabolic acidosis, and encephalopathy necessitate presentation.[16] This attitude of presentation has been partly responsible for the poor outcome of these patients. Although multifactorial, one important factor in our environment is ignorance. Many of our patients have tried other means such as traditional or spiritual medications, only presenting in hospital rather late with the small amount of money remaining, making it difficult to afford continues treatment such as RRT and other care.

One of the main aims of adequate hemodialysis is volume and blood pressure control. Sadly, many of our patients have fluid overload and severe hypertension. Several observational studies in the hemodialysis population have demonstrated that hypertension is associated with adverse consequences.[17-19] These adverse consequences include fatal arrhythmias and sudden death. It is, therefore, not surprising the high mortality seen in these patients.

Anemia is another major complication of ESRD and is a significant cause of reduced health-related quality of life, morbidity, and mortality in addition to adverse cardiovascular outcomes. In this study, the average hemoglobin of 7.3 ± 1.9 g/dl is far below the recommended target of 11.5–12.5 g/dl.[20] Several studies in Nigeria have reported a high prevalence of anemia at presentation.[13,21,22] That is why many patients had

blood transfusions at a certain period of time with its associated complications. Only four (about 2%) patients could afford regular erythropoietin, the remaining patients were on oral hematinics and occasionally parenteral Iron.

Hyperkalemia was seen in 30.6% and 40.3% of patients with AKI and CKD, respectively. In peritoneal dialysis patients, Torlén *et al*. have shown that abnormalities in serum potassium contribute disproportionately to the high death risk. [23] In a large observational study Kovesdy *et al*. also reported that after adjustment for potential confounding variables hyperkalemia (defined as serum potassium ≥ 5.6 mmol/L) was associated with higher all-cause and cardiovascular mortality in patients on maintenance HD.[24] Apart from inadequate dialysis, dietary indiscretion, blood transfusion, and metabolic acidosis are also important causes of hyperkalemia. Some of which are common features of our patients.

Perhaps, all the above factors could be responsible for the higher mortality of 25% seen in this study. However, of much significance is the adequacy of dialysis, which is a function of frequency and duration of the procedure. Whereas all international guidelines recommended at least three hemodialysis sessions per week,[25-27] only 3.4% of our patients could afford three sessions of hemodialysis per week, while >75% could only afford once-weekly session. Therefore, the majority of the CKD patients had inadequate hemodialysis with all its adverse consequences.

However, this is the norm rather than the exception in many centers in low- to middle-income countries. Several studies from across Nigeria have consistently reported a discontinuation rate between 70% and 90% among chronic hemodialysis patients within the first 12 weeks after commencing dialysis.[6,13] Alasia *et al*. from Port Harcourt south-south Nigeria, reported that within 12 weeks of commencing maintenance dialysis, 97% of the patients had dropped out of the program through deaths and abandonment.[12] Similarly, Oluyombo *et al*. in Ekiti, South-west Nigeria, reported that 73% of patients had discontinued hemodialysis by the end of 12 weeks, over a 3 years.[6] In many African countries, chronic dialysis is not sustainable, with patients unable to afford dialysis beyond the first 2–3 months.[22]

Conclusion

Although RRT services are available in Nigeria, high cost precludes its maximum utilization with attendant's high mortality and morbidity from the condition.

Limitation

Due to the retrospective nature of the study, causal relationship cannot be ascertained. More robust interventional studies are needed.

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Conflicts of interest

There are no conflicts of interest.

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