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Original Research

Demographic and Clinical Profile of Haemodialysis Patients with End-Stage Renal Disease in a Northern Nigerian Hospital: A Retrospective Analysis of Patterns and Outcomes

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Abstract

Background: Chronic kidney disease (CKD) is a global health challenge with increasing prevalence and substantial impacts on healthcare systems, particularly in low- and middle-income countries. Limited access to resources for managing CKD and end-stage renal disease (ESRD) in these regions exacerbates mortality and morbidity, highlighting the need for effective and accessible healthcare strategies. This study examines CKD prevalence, management practices, and outcomes across various populations, with a focus on the challenges faced in sub-Saharan Africa.

Methodology: This study utilized a retrospective, observational design to examine patient records from the haemodialysis unit at Yusuf Dantsoho Memorial General Hospital, Kaduna State, Nigeria. The research focused on the sociodemographic, clinical, and dialysis-related characteristics of patients who underwent haemodialysis between January 2019 and October 2024.

Results: CKD prevalence has significantly increased worldwide, with ESRD incidence notably in our centre. Access to dialysis varied greatly, with low-resource settings struggling to meet demand, contributing to poorer outcomes. In Africa, studies show that less than 10% of patients who needed dialysis accessed it. Additionally, CKD patients in lower-income regions often present with advanced diseases due to inadequate screening and preventive care. High mortality rates were linked to limited access to early treatment and a lack of government support for subsidizing renal care.

Conclusion: There was a pressing need to improve CKD prevention, early diagnosis, and treatment in resource-limited settings to reduce the burden of ESRD. Increased government investment, enhanced screening programs, and sustainable funding models for dialysis were essential to mitigate the impact of CKD.

Keywords: Chronic Kidney Disease; End-Stage Renal Disease; Dialysis; Low-Resource Settings; Global Health; Epidemiology; Sub-Saharan Africa; Healthcare Access.

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Quick Response Code:

Introduction

End-stage renal disease (ESRD) is the final stage of chronic kidney disease (CKD), where the kidneys can no longer sufficiently manage the body's requirements for waste filtration, fluid, and electrolyte balance. Haemodialysis (HD) serves as an essential, life-sustaining intervention for ESRD, providing a replacement for lost kidney function by removing toxins, excess fluid, and waste from blood. The global prevalence of ESRD is rising, and in regions with limited access to renal transplants, HD remains the predominant renal replacement therapy [1,2].

The progression of CKD and ESRD is influenced by numerous factors, with hypertension and diabetes as primary causes globally [3]. However, the prevalence of these risk factors and the characteristics of ESRD populations vary by region due to differences in healthcare access, socioeconomic conditions, and lifestyle factors. For example, studies in Nigeria have identified hypertension as a leading cause of CKD, with diabetes and glomerulonephritis as other significant contributors [4,5]. Despite the importance of haemodialysis in ESRD management, limited data are available on the profiles of HD patients in low-resource settings, including factors that affect dialysis frequency, duration, and outcomes.

Understanding these factors is crucial to optimizing HD care and improving patient outcomes. Haemodialysis poses a substantial physiological, financial, and social burden on patients and families [6]. Sociodemographic factors, such as age, occupation, and sex, can influence dialysis frequency, adherence, and quality of life [7]. The characteristics and duration of HD treatment are also associated with various clinical outcomes, making it essential to examine these variables for evidence-based practice [8].

This study analyzed the demographic, clinical, and treatment-related profiles of ESRD patients undergoing haemodialysis at Yusuf Dantsoho Memorial General Hospital, Kaduna State, Nigeria, over five years. By examining the relationships between factors such as age, sex, dialysis frequency, and treatment duration, this research sought to provide insights to guide improved HD management strategies in similar low-resource settings.

Methodology

Study Design

This study utilized a retrospective, observational design to examine patient records from the haemodialysis unit at Yusuf Dantsoho Memorial General Hospital, Kaduna State, Nigeria. The research focused on the sociodemographic, clinical, and dialysis-related characteristics of patients who underwent haemodialysis between January 2019 and October 2024.

Study Setting

The study was conducted at Yusuf Dantsoho Memorial General Hospital, Kaduna State, Nigeria. The hospital is a secondary care public hospital that provides haemodialysis services to patients with end-stage renal disease (ESRD) and other conditions requiring renal support. The hospital serves a diverse population, including patients from urban and rural areas, providing a broad representation of the population requiring haemodialysis in the region.

Study Population

The population consisted of all patients who received haemodialysis at the hospital from January 2019 to October 2024. The inclusion criteria were patients with documented haemodialysis sessions during the specified period; records that included details of patient demographics, causes of chronic kidney disease (CKD), dialysis frequency, and treatment duration.

The exclusion criteria were records with missing key information (such as age, sex, or cause of CKD) and patients with incomplete or unclear dialysis records.

Data Collection

Data was collected from patients' records maintained in the hospital's haemodialysis unit. A structured data extraction sheet was used to ensure consistency and comprehensiveness in data collection. The following variables were extracted. Sociodemographic Data: (Age, sex, occupation, and tribe). Clinical Characteristics: Causes of CKD (e.g., hypertension, diabetes, unknown causes). Dialysis Profile: Frequency of dialysis per week, total duration of dialysis (in weeks), and date of initiation. Age Group and HD Duration Classification: Age was classified into <60 years and ≥60 years. Haemodialysis duration was categorized as either less than 3 months or more than 3 months.

Statistical Analysis

Data was analyzed using the statistical software Social Package for Social Science (SPSS). The analysis involved descriptive and inferential statistics. The descriptive analysis such as frequencies and percentages were calculated for categorical variables such as age group, sex, occupation, tribe, and cause of CKD. Mean and standard deviation were used to describe normally distributed continuous variables. The inferential analysis utilized chi-square tests to evaluate the association between categorical variables, such as age and sex, or frequency of HD per week and total HD duration. Odds ratios and confidence intervals were calculated to determine the strength of association between factors, such as frequency of HD and HD duration. An odds ratio greater than 1 indicated a positive association. A p-value <0.05 was considered statistically significant.

Limitations:

The retrospective design may limit data accuracy by the incompleteness and unreliability of patient's records. Missing or incomplete records might have biased the findings. The study was conducted in a single hospital, limiting generalizability, thus the results might not reflect the population in other regions or facilities. Due to the observational nature, causal relationships could not be established. The findings only suggested associations, not causative factors. Confounding factors (e.g., socio-economic status, lifestyle, comorbidities) that could affect outcomes were not controlled, possibly affecting the observed relationships. Variability in data recording practices over the years might have introduced inconsistencies, particularly in records spanning a lengthy period.

Ethical Considerations

Approval of the study was obtained from the hospital's ethical review board. All data were anonymized and handled with confidentiality to protect patient privacy. No identifiable information was used in the analysis or reporting.

Results

The mean age of the participants was 49.3 ± 16.8 years. The average frequency of haemodialysis sessions per week was 1.19 ± 0.43, while the mean duration of dialysis treatment was 7.78 ± 11.25 weeks (Table 1).

Sociodemographic Variables: Most patients were middle-aged to older adults, with the largest groups being 51-60 (25.3%), 41-50 (19.0%), and 61-70 (16.1%) years. Younger patients (11-30 years) comprised 16.2%, and those over 80 years were 1.9%. Males represented 58.9% of the population, whereas females were 41.1%. The predominant tribal groups were Southern Kaduna (34.81%) and Hausa (34.49%),

followed by Igbo (12.03%) and Yoruba (7.28%). The largest occupational group was business (25.63%), followed by civil servants (20.57%) and housewives (18.67%).

CKD Causes: Hypertension was the leading cause of CKD (55.06%), followed by diabetes (10.13%). For 34.81% of patients, no cause of CKD was recorded.

HD Frequency and Duration: The majority (82.8%) underwent HD once weekly, while 15.6% received it twice, and 1.5% three times weekly. Most patients (79.7%) received HD for less than 12 weeks, with very few continuing for over 52 weeks.

Associations: There was no significant relationship between sex and age ($p = 0.414$) or age and HD duration ($p = 0.271$). However, a significant association was found between HD frequency and treatment duration ($p = 0.001$), indicating that higher HD frequency was associated with a longer duration.

Table 1: Sociodemographic of End stage renal disease patients undergoing Haemodialysis at YDMH Kaduna

Variable	Frequency	Percentage
Age distribution		
Age (years)		
11-20	16	5.1
21-30	35	11.1
31-40	44	13.9
41-50	60	19.0
51-60	80	25.3
61-70	51	16.1
71-80	24	7.6
>80	6	1.9
Total	316	100
Mean age±SD (years) = 49.3±16.8		
Sex distribution		
Male	186	58.9
Female	130	41.1
Total	316	100
Tribe		
Southern Kaduna	110	34.81
Hausa	109	34.49
Igbo	38	12.03
Yoruba	23	7.28
Idoma	10	3.17
Nupe	7	2.22
Fulani	5	1.58
Others	14	4.43
Total	316	100
Occupation		
Business	81	25.63
Civil servant	65	20.57
Housewives	59	18.67
Retirees	27	8.54
Farmers	9	2.85
Drivers	8	2.53
Artisan	7	2.21

Unemployed	4	1.27
Students	3	0.95
Others	54	17.09
Total	316	100

YDMH: Yusuf Dantsoho Memorial Hospital

Table 2: Dialysis profile of End stage renal disease patients undergoing Haemodialysis at YDMH Kaduna

Variable	**Frequency**	**Percentage**
Causes of CKD		
Hypertension	174	55.06
Diabetes	32	10.13
No record	110	34.81
Total	316	100.00
No of HD per week		
1	217	82.8
2	41	15.6
3	4	1.5
Mean frequency of Haemodialysis (HD)±SD (per week) = 1.19 ± 0.43		
Duration of HD (weeks)		
< 12	243	79.7
12- 24	41	13.4
25-52	18	5.9
>52	3	1.0
	305	100

Table 3: Test of association between Socio-demographics and Dialysis profile of End stage renal disease patients undergoing Haemodialysis at YDMH Kaduna

Variable	**Responses**		**Chi-square**	**Odd ratio**	**Confidence interval**	**P value**
Relationship between Sex and Aging	**<60 years**	**≥60 years**				
Female	97	33	0.667	1.234	0.745-2.045	0.414
Male	131	55				

Relationship between Sex and Aging	**HD < 12 weeks**	**HD ≥ 12 weeks**				
<60 years	171	48	1.212	0.693	0.359-1.335	0.271
≥60 years	72	14				
Relationship between frequency of HD per week and duration of HD	**HD duration less than 3 months**	**HD duration more than 3 months**				
HD once per week	178	38	13.235	3.423	1.721-6.807	0.001
HD two or more times per week	26	19				

Discussion

The results of this study provided a comprehensive demographic and clinical profile of haemodialysis patients at Yusuf Dantsoho Memorial General Hospital, with comparisons to similar findings in Nigeria, West Africa, Asia, Europe, and the United States. Each characteristic, from age distribution to causes of CKD and dialysis frequency, reflects broader trends observed regionally and internationally, while also highlighting unique patterns relevant to the study setting.

The age distribution indicated that the majority of patients fell within the middle-aged to older adult categories, particularly those aged 41-60. This pattern aligned with studies in Nigeria and other parts of West Africa, where patients with ESRD requiring dialysis are predominantly middle-aged [4]. A study in Nigeria also observed a significant concentration of dialysis patients in the 40-60 age group, suggesting early onset and progression of CKD among younger adults, potentially due to late diagnosis and limited preventive care [4]. In West Africa, factors such as high rates of hypertension and delayed access to treatment contribute to an increased ESRD burden in these age groups [9].

In contrast, data from developed countries like the United States and the United Kingdom reveal that dialysis patients tend to be older, with a mean age of around 65 years [10, 11]. European studies similarly report that most patients beginning dialysis are over 60 years old, as a result of better access to early-stage CKD care and preventive interventions in these countries [12]. Studies in Asia, however, show more variability. In India, dialysis patients were often younger, similar to the Nigerian cohort, likely due to limited healthcare access [13]. In Japan, where preventive care is well-integrated, the average age for dialysis initiation aligns more closely with Western data [14].

The male predominance in this sample, with 58.9% male and 41.1% female patients, reflects trends observed in other studies within Nigeria and West Africa. Similar findings were seen in Nigerian studies, where males were more likely to seek haemodialysis treatment, possibly due to socio-cultural factors that affect healthcare access and affordability for females [15]. Studies from West Africa have also reported a male-to-female ratio favouring males, though the difference is less pronounced than in Nigerian studies [16].

In the United States and Europe, the gender distribution among dialysis patients is more balanced, although males still tend to be more prevalent due to a higher incidence of CKD risk factors, such as hypertension and diabetes [17]. Similar trends were noted in Japan and South Korea, where males have a slightly higher prevalence in dialysis cohorts, attributed to higher rates of CKD progression in men [18].

The tribal composition of this cohort, with Southern Kaduna and Hausa patients representing the largest proportions, mirrors the regional demographics. Studies in Nigeria frequently report a patient composition that aligns with the surrounding population, emphasizing the role of locality in determining the demographic profile of dialysis centers [19]. In this cohort, Igbo and Yoruba patients made up smaller portions of the sample, reflecting the distribution of these groups within the region.

Occupational data revealed that a significant portion of patients (25.63%) were engaged in business, followed by civil servants and housewives. This occupational trend is typical in Nigeria and West Africa, where business and civil service employment are common among urban and peri-urban populations seeking dialysis [20]. Retirees and those with informal jobs also form part of the patient base, reflecting the socioeconomic diversity of individuals affected by ESRD.

Hypertension was identified as the primary cause of CKD in this cohort, responsible for 55.06% of cases, followed by diabetes at 10.13%. This finding aligned with similar studies in Nigeria, where hypertension is consistently the leading cause of CKD [21]. In West Africa, studies also confirmed that hypertension and diabetes were the major contributors to ESRD, with hypertension often presented earlier due to genetic predispositions and lifestyle factors [22].

In contrast, in the United States and Europe, diabetes was often the leading cause of ESRD, especially among older adults [23]. Studies in Asia showed that, while hypertension is also a significant cause of CKD, countries with high diabetes prevalence, like India and China, report diabetes as a primary contributor to ESRD [24].

Most patients in this cohort received dialysis once weekly (82.8%), with fewer undergoing dialysis two (15.6%) or three times per week (1.5%). This low frequency contrasts sharply with guidelines in developed countries, where thrice-weekly dialysis is the standard for most ESRD patients [25]. Limited resources and financial constraints may explain the infrequent dialysis schedules observed in Nigerian and other West African cohorts, where patients often cannot afford the recommended dialysis frequency [26].

The duration of haemodialysis in this cohort was predominantly short-term, with 79.7% receiving dialysis for less than 12 weeks. This short treatment duration contrasts with practices in the US, UK, and Europe, where patients often remain on dialysis long-term. The high rate of early dropout may reflect financial and logistical barriers to sustained dialysis in Nigeria and other parts of Africa, where affordability and availability of dialysis are significant challenges [27].

The study found no significant association between age and sex in dialysis patients ($p=0.414$), nor between age and dialysis duration ($p=0.271$). These findings indicate that age distribution among patients does not vary significantly by sex or HD duration. However, a significant association was found between dialysis frequency and duration, with patients receiving more frequent dialysis more likely to have a longer treatment duration ($p=0.001$). This association is expected, as higher treatment frequency often

correlates with better health outcomes and longer survival in dialysis populations, as seen in studies from both low- and high-income countries [28].

In summary, the demographic, clinical, and treatment characteristics of this cohort align with trends seen in Nigeria and West Africa, reflecting socioeconomic challenges and healthcare disparities that influence dialysis access and frequency. These findings highlighted the need for targeted policies to improve CKD management and dialysis accessibility, especially for underserved populations.

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