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Dialysis dose in end-stage renal disease patients undergoing regular hemodialysis at Ibn-Sena and Al-Nao hospitals in Sudan

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ABSTRACT

Introduction: Ne Hemodialysis (HD) plays a fundamental role in the treatment of end-stage renal disease (ESRD) patients. A minimal duration between 9 to 12 hours per week is required for maintaining adequate HD to restore excretory function of the kidney.
Objectives: To measure the average duration of HD among Sudanese patients, and compare with the universal recommended duration.
Patients and Methods: A cross-sectional, descriptive study at IBN-SENA hospital and ALNAO teaching hospital was conducted. All patients were subjected to full medical history and examination to identify their age, gender, original kidney disease and duration and route of HD.
Results: A total of 121 ESRD patients under regular HD participated in this study. The majority [78 (64.5%)] had an average duration of HD of 8 h/wk.
Conclusion: A large proportion of our patients on HD are below target dialysis dose; mainly due to reducing in the number of sessions per week and average duration per each session.

Implication for health policy/practice/research/medical education:
In a cross-sectional, descriptive study on 121 hemodialysis patients in Sudan, we found a large proportion of our patients are below target dialysis dose; mainly due to reducing in the number of sessions per week and average duration per each session.
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Introduction

Chronic kidney disease (CKD) is an irreversible deterioration in renal function over months to years. CKD is classified based on estimated glomerular filtration rate (eGFR) into five stages. End-stage renal disease (ESRD) is the CKD of stage 5 at which the patient starts renal replacement therapy (RRT) which includes hemodialysis (HD), peritoneal dialysis or kidney transplantation (1,2). CKD affects 5%-10% of the world population (3,4), led to 956 000 deaths globally in 2013 up from 409 000 deaths in 1990 (5). Both diabetes and hypertension are important causes of ESRD, since screening of at-risk patients is important to delay the progression of CKD (6). HD is the most commonly used in ESRD patients. Vascular access for HD must be established by a fistula, graft or catheter through which blood obtained for HD (7,8). The purpose of HD is to restore excretory function of the kidney and to sustain normal electrolyte concentration and fluid balance (9). For the majority of the patients is a minimal duration between 9 to 12 hours per week to maintain adequate HD (10).

Objectives

The aim of this study is to measure the average duration of HD among Sudanese patients to compare with the universal recommendation.

Patients and Methods

Study setting

This is a cross-sectional, descriptive study undertaken conducted between July to December 2017 at Ibn-Sena hospital center of renal disease and transplantation and AL-Nao teaching hospital center of renal dialysis.
The study population was all ESRD patients on regular

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HD for at least 12 weeks. Patients under the age of 18 years were excluded.

All patients subjected to full medical history and examination to identify their age, gender, original kidney disease, duration and route of HD, number of sessions per week and average duration of each session.

Ethical approval

The protocol of the study was approved by ethical committee of the Sudan medical specialization board. The current study was performed according to the Institutional Committee for the Protection of human subjects, which was adopted by the 18th World Medical Assembly, Helsinki, Finland and its later amendments. Written informed consents were obtained from the parents of both patients and controls.

Statistical analysis

Data was collected through a structured questionnaire that contained open and close-ended questions. The data was analyzed by IBM SPSS statistics 23. *P* value <0.05 were taken as significant.

Results

One hundred and twenty-one of ESRD patients under regular HD participated in this study. There were 80 (66.1%) males and 41(33.9%) females. The majority [34(28.1%)] had an age group between 50-59 years (Table 1).

Regarding duration of HD, most of patients [63(52.1%)] had dialysis duration between one to five years. Vascular access for dialysis was achieved by arteriovenous fistula in 94(77%) patients and by semi-permanent catheter in 23(19%) patients since only 4(3.3%) patients had temporary catheter (Table 2). In the comorbidity, hypertension was found in 43 (35.5%) patients followed by diabetes in 19(15.7%) patients (Table 3). The majority of patients [78(64.5%)] had average duration of HD of 8 h/wk, whereas 33 (27.3%) patients had average duration of HD around 6 h/wk and only 9(7.4%) patients had average duration of 12 h/wk (Table 4).

Table 1. Age and gender distribution in the study population

	No.	Percent
Age (y)		
18 years to 29 years	14	11.6
30 years to 39 years	21	17.4
40 years to 49 years	24	19.8
50 years to 59 years	34	28.1
60 years or more	28	23.1
Gender		
Male	80	66.1
Female	41	33.9

Table 2. Duration of hemodialysis and vascular access in the study population

	Number	Percent
Duration of hemodialysis		
3 months to 11 months	13	10.7
1 year to 5 years	63	52.1
More than 5 years	45	37.2
Vascular access		
Arteriovenous fistula	94	77.7
Semi-permanent catheter	23	19
Temporary catheter	4	3.3

Table 3. The cause of ESRD in study population

	Number	Percent
Renal failure cause		
Diabetes	19	15.7
Hypertension	43	35.5
Obstructive uropathy	13	10.7
PCKD	3	2.5
Others	43	35.5

Table 4. Dialysis characteristics (rate, average duration of each session and hemodialysis dose per week)

	Number	Percent
Rate of HD session per week		
One session	1	0.8
Two sessions	108	89.3
Three sessions	12	9.9
Average duration of each session		
Two to three hours	37	30.6
Three to four hours	84	69.4
Hemodialysis dose per week		
Three hours per week	1	0.8
Six hours per week	33	27.3
Nine hours per week	78	64.5
Twelve hours per week	9	7.4

Discussion

The majority of ESRD patients undergoing regular HD are males with a risk factor for developing CKD and ESRD in our country.

Hypertension plays a major role as the most common cause of ESRD in the study population. Data in this study was concordant with the study by Banaga et al (11).

Only 9 patients (7.4%) had adequate HD dose and the remaining (92%) had dialysis dose less than the universal recommendation. Several factors lead to this gap. Firstly; 180 patients (89.3%) undergo two sessions rather than three per week due to restricted resources and lack of sufficient number of HD machines to cover ESRD patients. Additionally, more than 30% of the patients have only average 2-3 hours per each session. This could

be due to improper HD which affects perpetuation of the sessions. In addition, traffic and transportation inefficiency is responsible for patient's arrival behind the schedule, since some patients had a tendency to terminate the dialysis session before reaching the target hours due to individualized reasons.

Conflicts of interest

The author declares that he has no conflicts interest.

Ethical considerations

Ethical issues (including plagiarism, data fabrication, double publication) have been completely observed by the author.

Author's contribution

EAI is the single author of the manuscript.

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