

Frequency of Neurological Complications among Patients with End Stage Renal Disease on Hemodialysis

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DOI: [10.36347/sjams.2022.v10i03.025](https://doi.org/10.36347/sjams.2022.v10i03.025)

| Received: 26.02.2022 | Accepted: 22.03.2022 | Published: 31.03.2022

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Abstract

Original Research Article

Objectives: To assess the neurological complications among end stage renal disease (esrd) patients on hemodialysis. **Methods:** This descriptive study was conducted at the Departments of Internal Medicine and Nephrology, Medical Teaching Institute (MTI), Lady Reading Hospital (LRH), Peshawar, from March 2020 to March 2021 among ESRD patients. All Chronic Kidney Disease (CKD) patients were on Hemodialysis (HD) for more than six months before enrolling in the study. The patients were followed for 06 months on HD. During this time, any neurological event was documented and recorded. All patients on HD, of any gender with age ranging from age 15 to 70 years were included in this study. Patients below the age of 14 years, patients with acute renal failure, congestive cardiac failure, cirrhosis of liver, malignancy, disseminated intravascular coagulation, sepsis; meningitis and encephalitis were excluded from this study. SPSS version 23 was used to analyze the data. **Results:** This descriptive study was conducted at the Departments of Internal Medicine and Nephrology, Medical Teaching Institute (MTI), Lady Reading Hospital (LRH), from March 2020 to March 2021 among ESRD patients. All Chronic Kidney Disease (CKD) patients were on Hemodialysis (HD) formore than six months before enrolling in the study. The patients were followed for 06 months on HD. During this time, any neurological event was documented and recorded. All patients on HD,of any gender with age ranging from age 15 to 70 years wereincluded in this study. Patients below the age of 14 years, patients with acute renal failure, congestive cardiac failure, cirrhosis of liver, malignancy, disseminated intravascular coagulation, sepsis; meningitis and encephalitis were excluded from this study. SPSSversion 23 was used to analyze the data. **Conclusions:** Cerebrovascular diseases and dialysis dementia are the most common neurological complications among patients on hemodialysis in our study. These should be considered earlier than expected as it may have an effect on long term outcome and prognosis of these patients on hemodialysis.

Keywords: Hemodialysis, Neurological complications, End Stage Renal Disease (ESRD).

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INTRODUCTION

CKD is a debilitating illness and has increasing incidence and prevalence around the world [1]. Over 2% progress to ESRD [2]. HD is the most frequent modality of Renal Replacement Therapy (RRT) accounting for almost 90.6% of all patients with ESRD on RRT [3]. HD interferes with patient's life in different ways. It has many adverse effects and complications, needing immediate attention and correct management [4]. Cardiovascular, neurological, sleep disturbance, fatigue, risk of peptic ulcer bleeding along with viral hepatitis and infections are

among the most common complication of HD [5-9]. Cardiovascular accidents are the commonest cause of mortality among these patients accounting for almost half of sudden cardiac death among ESRD population [10, 11].

Neurological manifestations in patients on HD should never be underestimated. These may involve both the peripheral as well as central nervous systems. Uremic encephalopathy, neuropathy, atherosclerosis and myopathy are among the most debilitating clinical consequences of uremia, ranging from 2-30% [12].

Looking into the prevalence of different neurological complications across the world, there is a wide range of variability across the U.S, Europe, Chinese, Asians and the Pakistani population; and studies in our population are very limited. This study may give us a guide of the neurological complications and will definitely be of importance in reaching proper diagnoses and in time management of such an issue.

METHODOLOGY

This is a descriptive study conducted at the Departments of Internal Medicine and Nephrology, Medical Teaching Institute (MTI), Lady Reading Hospital (LRH), from March 2020 to March 2021 among ESRD patients. This study was conducted after approval from hospital ethical and research committee, in LRH called, Ethical Review Board (ERB). Patients admitted and meeting the inclusion criteria were briefed about this study and its purpose. We took informed written consent from all participants. All patients were on HD for more than six months before enrolling in the study. The patients were followed for 06 months on HD. During this time, any neurological event was documented and recorded. All patients on HD from age 15 to 70 years were included in this study. Patients below the age of 14 years, patients with acute renal failure, congestive cardiac failure, cirrhosis of liver, malignancy, disseminated intravascular coagulation, sepsis; meningitis and encephalitis were excluded from the study. SPSS version 23 was used for analyzing the data.

RESULTS

Total number of patients was 160. Total number of males were 101 and female were 59(Fig 1). Male to female ratio was 1.71:1. Average number of Hemodialysis sessions was 37. Neurological complication occurred in 63

(39.3%). The most frequent neurological complication were Intradialytic hypotension, followed by Cerebrovascular accident, Encephalopathy, Dialysis dementia, Neuropathy, Dialysis disequilibrium, Reversible leukoencephalopathy, Central pontinemyelinosis, Autonomic dysfunction and Myopathy. These complications are presented in form of figures and tables.

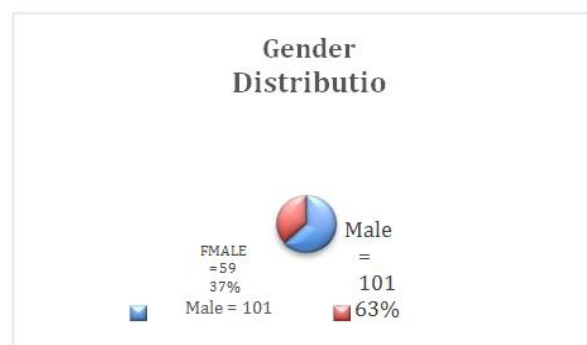
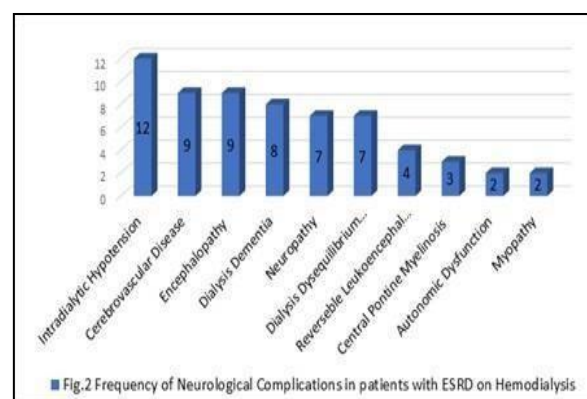


Fig-1: Gender-wise distribution of ESRD patients on HD



S. No	Neurological complication	Percentage
1	Intradialytic hypotension	19%
2	Cerebrovascular accident	14.3%
3	Encephalopathy	14.3%
4	Dialysis dementia	12.7%
5	Neuropathy	11.1%
6	Dialysis disequilibrium	11.1%
7	Reversible leukoencephalopathy	6.3%
8	Central pontinemyelinosis	4.8%
9	Autonomic dysfunction	3.2%
10	Myopath y	3.2%
11	Total	100%

DISCUSSION

Chronic Kidney Disease had been accepted as an important pointer for cerebrovascular accident beside common CV risk factors [13]. Stroke is a significant reason for mortality and morbidity in patients with CKD [14]. While searching the literature, the incidence of CVA (cerebrovascular accident)/stroke increased nearly three months before initiation of dialysis and reached to peak at 4-7 times after initiation of HD, in a cohort design study of Medicare insured patients with CKD on HD [15]. After

dialysis initiation the cerebrovascular event rates were measured in 1061 incident hemodialysis by The Choice for Healthy Outcomes in Caring for ESRD (CHOICE) study. The incident rate was 20.9 per 100 patient-years for the first two years after HD initiation [16]. This is comparable with our results. The event rate of CHOICE study was rather more because in CHOICE study patients with previous stroke were not excluded. In a study, the US Renal Data System (URDS) Dialysis Morbidity and Mortality Studies, the incident was 33 per 1000 patient years (3.3 per 100 patient- years) of hospitalized and fatal

stroke in combined incident and prevalent dialysis patients [17]. In another study comprising of 449 incident dialysis patients in Spain, the incidence of stroke for first three years of HD was 2.4 per 100 patient-years, but the time period before dialysis initiation and the incidence during 1st year was not separately mentioned [18]. After adjustment for age and gender, it was found that frequency of patients having stroke and admitted in hospital for hemodialysis was 5-10 fold more than non-ESRD subjects. Our findings are comparable with the above-mentioned study of increased incident rates of stroke among hemodialysis patients, though our study did not compare the incident with non-ESRD patients. Other than stroke, large scale of neurological symptoms during HD are frequently described. The main wide-ranged symptoms those were described included: fatigue (82%), Intradialytic Hypotension (76%), cramping aches and pains (76%), post-dialysis dizziness (63%), headache (54%), itching/pruritus (52%), and backache (51%) in a study having 550 patients on hemodialysis therapy with nausea and vomiting being reported too [19]. In data stratification of blood pressure (BP) of a huge dialysis organization, the frequency of IDH was found to be 7.5-12.3% [20]. IDH is related with increased risk (30%) of death in one year follow up [21]. In another study where IDH was notably integrated with increased risk of thrombosis, myocardial infarction and hospitalization due to fluid over or load heart failure, and main unfavorable cardiac event i.e. stroke myocardial infarction, cerebrovascular accident, or cardiovascular associated death [22, 23].

The most frequent neurological complication is cognitive impairment ranging from mild cognitive impairment to dementia [24, 25]. Evaluation of cognition is restricted to cross-sectional design studies in dialysis dependent patients. Fazekas *et al.* compared cognitive ability in 30 consecutive dialysis dependent patients and 30 controls [26]. Cognitive impairment was found in 18 (60%) HD patients and in no controls. Similarly, Sehgal *et al.* found 32% HD patients to be somewhat cognitively impaired, while 8% were reported as severely cognitively impaired among total 336 dialysis patients [27]. From these two above mentioned studies, the investigators have reached a conclusion that in dialysis patients an increased prevalence of unidentified cognitive impairment exists. Our study also observed the same prevalence as shown by the aforementioned international studies.

In the Tokyo-based study in dialysis patients of age more than 65 years, there was 4.2% incidence of one year dementia. One year multi-infarct dementia incidence among dialysis patients aging more than 65 years was found to be 7.4 times more than general elderly people, and it suggests that elderly dialysis patients are at increased danger of multi-infarct dementia [28]. If summarized, neither already presents clinical data nor administrative data of the US Renal Data System gives profound information to evaluate the load of dementia in these ESRD patients. Nevertheless, the present data suggests that the incidence is many times higher of the general population.

A number of proofs in the past literature show the association between degree of renal function or number of HD sessions and neuro-cognitive impairment [29]. In studies comparing renal transplantation and non-dialyzed uremic patients with patients undergoing HD treatment, found that the former were having consistently more cognitive impairment [30]. In some other studies, where HD patients and controls were compared, HD patients were having more cognitive impairment [31]. In one latest study of US dialysis it was noted that in comparison with the general population, for clinical stroke age relative risks were 9.7 and 6.1 for white females and males respectively [32]. Even higher dementia rates were noted in general population following clinical stroke [33]. Our study did not include the population with stroke before starting of HD.

CONCLUSION

Cerebrovascular diseases and dialysis dementia are the most common neurological complications among patients on hemodialysis in our study. These should be considered earlier than expected as it may have an effect on long term outcome and prognosis of these patients on hemodialysis.

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