



Assessment of Cognitive function and Complications in Patients Undergoing Hemodialysis

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ABSTRACT

ESRD causes changes within the daily lives of patients, creates limitations to perform activities and features a great impact on emotions and quality of life. Cognitive Impairment is common in individuals with CKD, particularly among those treated with dialysis. The aim of the study was to assess the cognitive function, complications, adherence and psychological distress in patients undergoing hemodialysis. The psychological distress was measured using Kessler psychological distress scale K10 and 19(21.12%) subjects had mild distress, 9(10%) subjects with moderate distress and 6(6.66%) had severe psychological distress. Adherence was assessed using the End Stage Renal Disease Adherence Questionnaire (ESRD-AQ). It was found that all the 90(100%) subjects were adherent to hemodialysis attendance and medication. Hemodialysis related acute complications were assessed and it was shown that 84(93.33%) subjects had cardiovascular complications, 86(95.55%) subjects had neuromuscular complications, 72(80%) subjects had electrolyte imbalance, and 83(92.23%) subjects experienced complications like itching, sleep disorders, back pain etc. It was concluded that there would be an improvement in the QOL of subjects if there were necessary interventions & patient education in the early stages of CKD that can help in improving self-management skills of the individual subjects and prevent progression from staging 5-CKD.



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INTRODUCTION

Chronic kidney disease (CKD) occurs when there is gradual loss of kidney function or structure for more than 3 months. CKD is very common, and it affects about 11% of the world's population. In India, the number of new patients diagnosed with ESRD is over 100,000 per year (Dash and Agarwal, 2006). Cognitive Impairment is common in individuals with CKD, particularly among the elders and those treated with dialysis. Cognitive impairment may lead to depression, worsen QOL and even mortality. There are several reasons for this, including a high prevalence of cerebrovascular disease, side effects of medications, anemia and depres-

sion. Early recognition may provide an opportunity for care planning before dementia becomes advanced and it is a poorly recognized problem that affects 16-38% of patients with ESRD (Arema et al., 2005). ESRD patients on hemodialysis are prescribed multiple complex regimens and are at high risk of medication nonadherence. Complications of hemodialysis include hypotension, cramps, headache, back pain, cardiac arrhythmias, nausea & vomiting, itching, chest pain, bone diseases, dialysis disequilibrium syndrome, xerostomia, sleep disorders, fluid overload, electrolyte imbalance, bleeding from access point etc. Peripheral nerve dysfunction is one of the complications of CKD. Neuropathy occurs in at least 65% of patients undergoing dialysis and is the most common neurological consequence of chronic uremia (Mark and Brett, 2013). Mild to moderate psychological distresses is common in end stage renal disease patients, with a prevalence rate of 39% among people receiving dialysis compared with a prevalence of 27% in patients with chronic kidney disease (stages 1-5). Comorbid psychological distress and ESRD are associated with higher rates of mortality (Michael et al., 2013).

MATERIALS AND METHODS

Participants and study design

The study was observational. A total of 90 ESRD patients on maintenance hemodialysis, who consented to participate in the study, were recruited consecutively from the Nephroplus dialysis unit, ESIC hospital, Bengaluru, India, during the study period of 6 months. The subjects above 18 years of age and were on maintenance hemodialysis for 3-4 hours per session, 3 times per week, were included. The subjects with a history of neurological disorders, who had a renal transplant, on drugs having peripheral neuropathy as toxicity (Amiodarone, anti-cancer drugs, Disulfiram, anti-TB drugs, Phenytoin, Pyridoxine, Nitrofurantoin etc.), Pregnant and Lactating women were all excluded from the study. Data was collected from the selected subjects with the help of a structured questionnaire. Subjects were also counseled about their disease during their first visit and a follow up was done after a month. Collected data were entered in Microsoft Excel and appropriate statistical analysis was done to evaluate the objectives of the study.

Study tools

Data was collected using a self-designed data collection form, which contains details like demography, chief complaints, history of present illness, medication and medical history. Six Item Cognitive Impairment Test – (6CIT) was used to test the cognitive

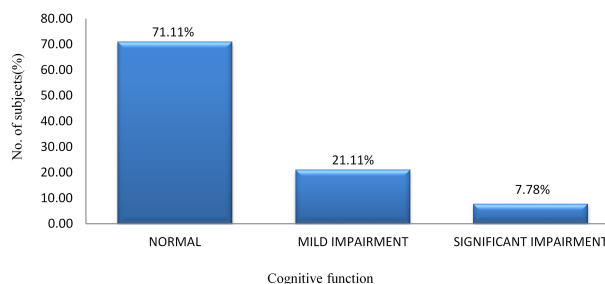


Figure 1: Distribution of subjects based on Cognitive Function

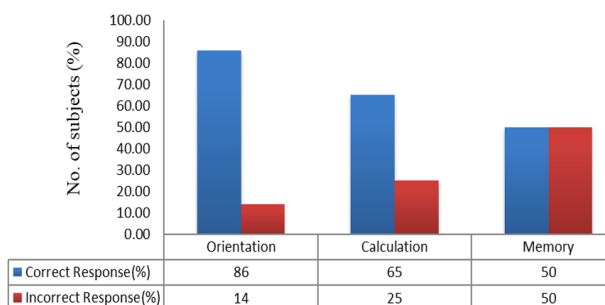


Figure 2: Distribution of response received for 6CIT Questionnaire

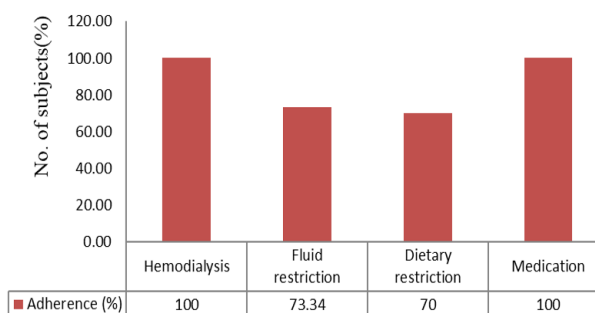


Figure 3: Distribution of subjects based on adherence

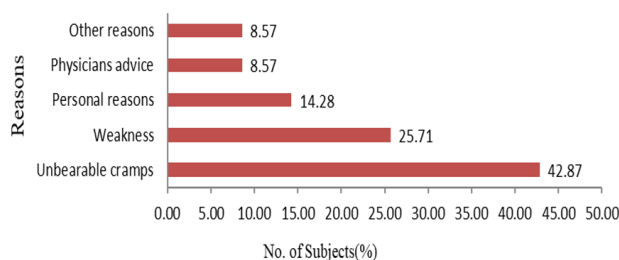


Figure 4: Distribution of subjects based on the reasons for shortening the session

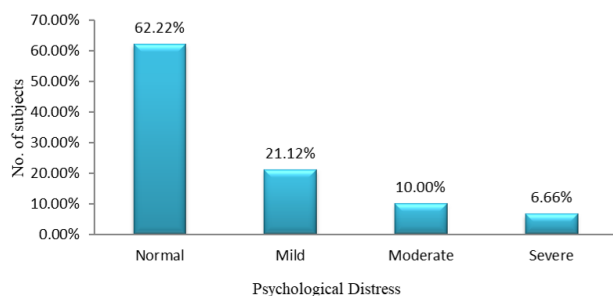


Figure 5: Distribution of Subjects based on Psychological Distress

function. Michigan Neuropathy Screening Instrument – (MNSI) to screen the presence of neuropathy. End Stage Renal Disease Adherence Questionnaire - (ESRD-AQ) is a 46-item questionnaire divided into 5 sections to assess adherence. Kessler’s 10 – (k10) was used to measure psychological distress.

Ethical Clearance

The study was approved by the Institutional Ethical Committee of ESIC MC-PGMSR, Rajajinagar.

Statistical analysis

All information obtained was entered in Microsoft Excel and appropriate analyses were performed using SPSS. The data collected in the study were analyzed using descriptive statistics. The categorical variable will be presented in the form of frequency tables and represented graphically wherever necessary. The quantitative variables are described by means of descriptive statistics like mean, standard deviation and 95% confidence interval. Statistical analysis was performed using Fisher’s exact probability to find the association between etiology and Peripheral neuropathy. Pearson correlation was done to find the correlation between age, gender and other factors with cognitive function and distress. Kruskal Wallis test was done to find an association between age and distress. For inferential statistics, the results were considered statistically significant wherever *the* p-value is less than 0.05.

RESULTS AND DISCUSSION

Assessment of cognitive function in patients undergoing hemodialysis

The study included a total of 90 subjects, of which 65 were male and 25 were female. Cognitive function was assessed using 6CIT. It has three domains, namely orientation, calculation and memory. It was found that (71.11%) subjects had normal cognitive function, (21.11%) subjects with mild impairment, and (7.78%) subjects with significant impairment,

as shown in Figure 1. In a similar study conducted by San A et al., 6.6-51% of subjects were cognitively impaired (San et al., 2017).

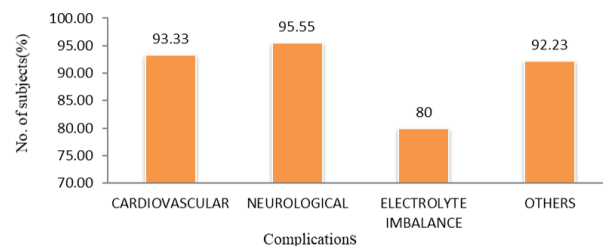


Figure 6: Distribution of HD Complications among subjects

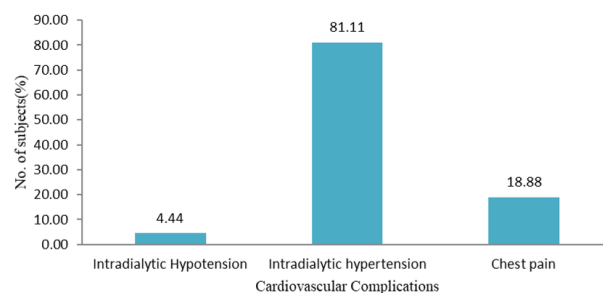


Figure 7: Distribution of subjects based on Cardiovascular Complications

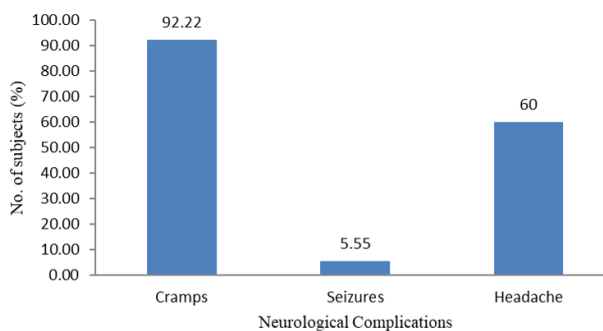


Figure 8: Distribution of subjects based on neurological complications

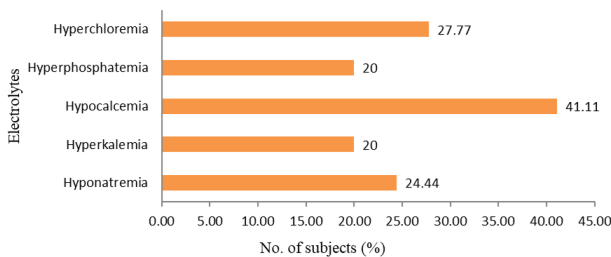


Figure 9: Commonly observed electrolyte imbalances

Females were found to have more significantly impaired cognitive function (12%) as compared to males (6.15%). The memory domain was highly affected, followed by calculation then orientation, as shown in Figure 2.

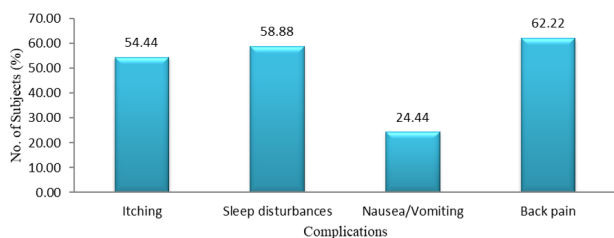


Figure 10: Other common complications among subjects

Using statistical analysis, a moderate negative correlation was observed between hyponatremia and cognitive impairment ($r=-0.5$) with a p-value of 0.02 (<0.05), which was statistically significant, as shown in Table 1, and similar findings were seen in a study conducted by Rong Xu et al., (Xu et al., 2015).

Assessment of level of adherence

The adherence of subjects to the four important domains of Hemodialysis: Hemodialysis attendance, Fluid restrictions, Dietary restrictions, and Medication adherence were assessed using ESRD-AQ.

In a similar study conducted by Karam SN et al., reported adherence to HD sessions was 52% while that for medications was 81%, Dietary adherence 24% and fluid restriction 31% (Karam et al., 2017). Figure 3 shows the distribution of study subjects based on adherence.

Hemodialysis Attendance

It was found that all the 90(100%) subjects were adherent to hemodialysis attendance, but there were people who shortened the dialysis duration. Out of 90, 35 (38.88%) subjects were found to have shortened their dialysis duration.

These 35 subjects (80%) have shortened by 30 minutes and (20%) by 60 minutes. The reasons for shortening are shown in Figure 4.

Table 1: Correlation between Cognitive Impairment and Hyponatremia

Predictor	Coefficient Correlation	p value
Hyponatremia	-0.5	0.02

Level of significance ($p < 0.05$)

Measurement of psychological distress

The psychological distress was measured using Kessler psychological distress scale (k10). 62.22% of subjects had no distress, 21.12% subjects had mild distress, 10% subjects with moderate distress and 6.66% had severe psychological distress (Figure 5). Females suffered more from psychological distress (60%) than males (29%).

Table 2: Relationship between aetiology and Peripheral neuropathy

Peripheral Neuropathy	Diabetes		p-value
	Yes	No	
Present	26	9	0.01
Absent	22	33	

The association between Psychological distress scores and different age groups were analyzed by the Kruskal-Wallis test at a significance level (α) of 0.05. There were no statistically significant differences in the scores in relation to different age groups.

The proportion of hemodialysis related acute complications

The majority of the subjects experienced dialysis related complications. In this study, only acute complications were included, divided into Cardiovascular, Neurological, Electrolyte Imbalance, and other complications, as shown in Figure 6.

Cardiovascular complications

It includes Intradialytic Hypotension (4.44%), Intradialytic Hypertension (81.11%) and Chest pain (18.88%) (Figure 7).

Neurological complications

Neurological complications are an extremely common complication of ESRD patients, manifesting in almost all dialysis patients, and leading to weakness, reduced exercise capacity, and disability. We included Cramps, Headache, and Seizures in this study, as shown in Figure 8.

Peripheral neuropathy

Peripheral neuropathy is also a neurological complication. It is a common complication of diabetes and also occurs in ESRD patients on dialysis. In this study, Peripheral Neuropathy was present in (38.89%) of subjects and absented in the rest (61.11%). The main etiology for PN is diabetes. Table 2 shows the relationship between etiology and peripheral neuropathy.

Fishers exact test was performed and it was found that there is a significant relationship between having diabetes and the occurrence of peripheral neuropathy with a p value of 0.01(<0.05). On the contrary, a study conducted by Anbarasu DS et al. concluded that 92% of their subjects had PN and that no relationship was observed with aetiology (Anbarasu and Prathiba, 2018).

Electrolyte imbalance

In dialysis patients, Hyponatremia, Hyperkalemia,

Hypocalcemia, Hyperchloremia, and Hyperphosphatemia are the commonly observed electrolyte imbalances, as shown in Figure 9.

Figure 10 shows other common complications such as Back pain (62.22%), sleep disturbances (58.88%), itching (54%), Vomiting (24.44%).

CONCLUSIONS

Healthcare professionals should consider the likely high prevalence of psychological distress and depression among CKD patients and the need for specific mental health services to confirm the diagnosis and initiate effective management. It is suggested to educate patients regarding their adherence to the dialysis schedule to minimize their HD associated complications such as back pain, headache, itching and cramps. Thus, the present study concludes that necessary interventions & patient education can help in improving the self-management skills of the individual patients.

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Conflict of Interest

The authors declare that they have no conflict of interest.

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