

ASSESSMENT OF COGNITIVE FUNCTION IN PATIENTS WITH CHRONIC KIDNEY DISEASE

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ABSTRACT

Objectives: The objectives of this study were to evaluate cognitive profile in patients with chronic kidney disease (CKD) pre-dialysis and post-dialysis, to assess the severity of cognitive impairment in patients with kidney disease before and after dialysis, and to determine the association of cognitive impairment in relation to dialysis.

Methods: A total of 59 patients were recruited with CKD Stage V on dialysis for >6 months. Cognitive function of the patient was assessed by Montreal Cognitive Assessment test scale method for three intervals (before dialysis and two intervals post-dialysis), and the incidence of impairment was analyzed using one-way ANOVA variance test.

Results: Among the 59 patients, there were 13 patients with the age of 18–33 years (22.033%), 11 patients with from age 34 to 49 years (18.64%), 21 patients at the age of 50–65 years (35.59%), and 15 patients around 66–80 years (25.42%). From the above categories, population with the age of 50–65 years is at maximum affected by CKD. Among the 59 patients, 24 patients (40.677%) are male and 35 patients (59.33%) are female. There was a mild significant difference seen in cognitive functioning between pre-dialysis and post-dialysis ($p \leq 0.02$).

Conclusion: It was found that patients with CKD had mild-to-moderate cognitive dysfunction due to morbidities associated with CKD. In this study, significant differences of cognitive function result in CKD patients and the severity of cognitive impairment was associated with the severity of the kidney disease, which improved with dialysis. Finally, our study suggests that cognitive performance was improved after initiation of dialysis and that further management through medications could provide a better outcome in cognitive performance.

Keywords: Chronic kidney disease, Cognitive assessment, Post-dialysis, Pre-dialysis.

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INTRODUCTION

The kidney disease improving outcomes (2012) clinical practice guidelines define chronic kidney disease (CKD) as persistent abnormalities to renal morphology and function for a period of > 3 months with due to implications for health [1,2]. Classification of CKD stages is made on the basis of glomerular filtration rate (GFR), albumin, and etiology. Characterized by a GFR of <15 ml/min/1.73 m², end-stage renal disease (ESRD) remains the final stage of CKD in which hemodialysis and renal transplant are the therapeutic options for uremic clearance and restoration of renal function, respectively [3,4]. Type 2 diabetes mellitus and hypertension have evolved as the major cause of ESRD due to the widespread global pandemic of the disease [5,6]. Outcomes of CKD include not only kidney failure but also complications of decreased kidney function, cardiovascular disease, and loss of cognitive function [7,8]. The current evidence suggests that some of these adverse outcomes can be prevented or delayed by early detection and treatment [9-11].

METHODS

A longitudinal study of 6 months was carried out. This study was carried out multispecialty hospital, Chennai, at dialysis unit in the nephrology department. A total of 60 patients under single group were studied. All the CKD patients of either gender of age >18 years undergoing dialysis were taken for the study. Inclusion criteria include patients with CKD undergoing dialysis. Exclusion criteria, patients with other psychotic disorders such as schizophrenia and Alzheimer's were excluded, pregnant and lactating women were excluded, and patients not willing to participate were also excluded from the study. Approval of study protocol by the institutional ethical committee was obtained

before commencement. Patients with CKD and other study criteria are enrolled in the study. Clinical information relevant for the study such as medication charts, previous medical problems, and current treatment plan of dialysis was obtained from the patient; written consent was obtained from all the patients. The patients enrolled in the study are assessed for the cognition function test according to widely accepted testing categories (orientation and attention, perception, memory, language, and executive functions) using Montreal Cognitive Assessment (MOCA) scale. The cognitive functions are assessed at baseline (before dialysis) and monitored at regular intervals. The cognition testing will be assessed 3 times - at baseline, after 2 months, and at the end of the 6th month. The cognitive function will be determined by comparing the scores obtained by the individual in all the three intervals according to the MOCA scale scoring. Statistical analysis was carried out using GraphPad Prism 7. Descriptive summary statistics were presented as mean and S.D for parametric data and median and quartile for non-parametric data. The cognitive impairment between all the three intervals (before and after dialysis) was compared and analyzed using one-way ANOVA analysis of variance, ethical committee approval No. VISTAS-SPS/IEC/II/2017/11.

RESULTS

The study included 59 patients in which all were cases diagnosed with CKD on dialysis. The results of study showed that 59 patients with CKD in various age groups. Among the 59 patients, there were 13 patients with the age of 18–33 years (22.033%), 11 patients with from age 34 to 49 years (18.64%), 21 patients at the age of 50–65 years (35.59%), and 15 patients around 66–80 years (25.42%). From the above categories, population with the age of 50–65 years is at maximum affected by CKD. Among the 59 patients, 24 patients (40.677%) are male and 35 patients

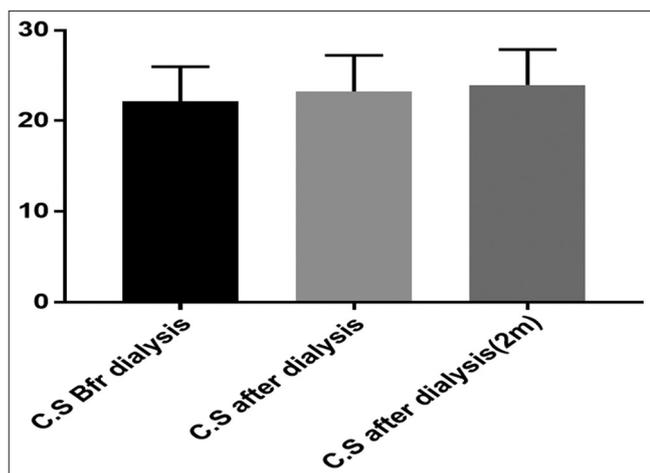


Fig. 1: One-way ANOVA data

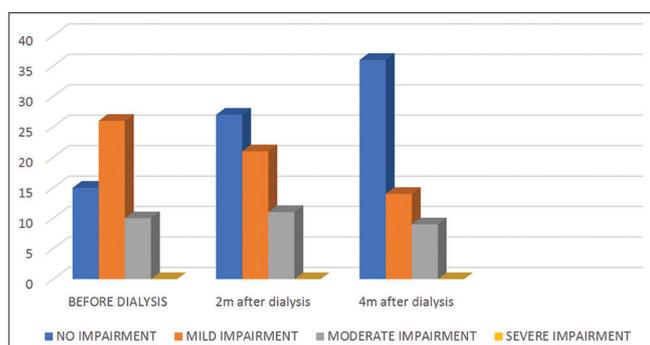


Fig. 2: Cognitive scoring before and after dialysis

Table 1: Distribution based on gender

Gender	Number of patients (n=59)	Percentage of patients (%)
Male	24	40.677
Female	35	59.33

Table 2: Distribution based on age

Age	Number of patients (n=59)	Percentage of patients (%)
18-33	13	22.033
34-49	11	18.644
50-65	21	35.59
66-80	15	25.42

(59.33%) are female. The various baseline characteristics in CKD patients. It was noted that all the parameters including hemoglobin, urea, and creatinine showed drastic variations from normal levels and this relates to the disease factor. After analyzing between all the three intervals of cognitive testing, there was statistically a mild significance observed in cognitive function. Table 5 shows the extent and severity of impairment before dialysis to which the individuals are affected and the level of change in impairment post-dialysis period (Tables 1-4).

CONCLUSION

It was found that patients with CKD had mild-to-moderate cognitive dysfunction due to morbidities associated with CKD. In this study, significant difference of cognitive function results in CKD patients, and the severity of cognitive impairment was associated with the severity of the kidney disease, which improved with dialysis. Finally, our study

Table 3: Baseline characteristics in CKD patients

Baseline characteristics	Number of patients (n=59)
Systolic BP (mmHg)	138.5±14.15
Diastolic BP (mmHg)	83 (2.57)
Blood urea (mg/dl)	90.78±38.14
Serum creatinine (mg/dl)	6.593±2.497
Sodium (mmol/l)	138.4±5.527
Potassium (mmol/l)	4.9 (1.2)
Hemoglobin (g/dl)	10.09±1.598

*Parametric data presented as mean and S.D and non-parametric as median and quartile, BP: Blood pressure, CKD: Chronic kidney disease

Table 4: Analysis of cognitive performance in CKD patients

Cognitive function	ANOVA test value	p value
Before and after dialysis	7.463	0.0240

CKD: Chronic kidney disease

Table 5: Distribution of cognitive impairment before and after dialysis

Scoring	Number of patients before dialysis	Number of patients after dialysis (2 m)	Number of patients after dialysis (4 m)
No impairment	15	27	36
Mild impairment	26	21	14
Moderate impairment	10	11	9
Severe impairment	0	0	0

Total points: 30, No impairment: ≥26, Mild impairment: 19-23, Moderate impairment: 10-18, Severe impairment: ≤9

suggests that cognitive performance was improved after initiation of dialysis and that further management through medications could provide a better outcome in cognitive performance.

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