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Original Article

NCCT Head findings in patients of chronic renal failure with altered sensorium presenting in a tertiary care centre

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Abstract
Introduction: *Central nervous system (SNS) is commonly affected in uremics and also has been investigated variably in these patients. Various hypothesis have been postulated from time to time regarding etiology of the central nervous system tract lesions in chronic renal failure. Urea has been implicated in most of the studies.*
Aim: *The objective is to study the NCCT Head findings in patients of chronic renal failure.*
Materials and Methods: *This is a prospective study for a period of one year from nov. 2016 to oct. 2017 conducted at GMC, Jammu which is a tertiary care centre. In our study 64 patients were enrolled, 36 (56.25%) were males and 28 (43.75) were females. Age of patients ranged from 18 to 60 years.*
Results: *out of 64 patients undertaken in our study, 8 patients (12.5%) had ischaemic stroke, 6 patients (9.37%) had haemorrhagic stroke while 2 patients (3.12%) had both the lesions.*
Conclusion: *Neurological manifestations have been frequently reported in patients of chronic renal failure. Patients of CKD have moderate to severe chronic cognitive impairment, yet it is largely undiagnosed.*
Keywords: *central nervous system, chronic renal failure, glomerular filtration rate.*

Introduction

Chronic kidney disease / chronic renal failure encompasses a spectrum of different pathophysiological processes associated with abnormal kidney function and a progressive decline in glomerular filtration rate (GFR). Table 1provides a widely accepted classification, based on guidelines of the National Kidney Foundation [Kidney Dialysis Outcomes Quality Initiative (KDOQI), in which stages of CKD are defined according to the estimated GFR.

Stage	GFR, ml/ min per 1.73m^2
0	>90
1	≥90
2	60-90
3	30-59
4	15-29
5	<15

The term chronic renal failure applies to the process of continuing significant irreversible reduction in nephron number and typically corresponds to CKD stages 3-5. Uremia affects every organ system of body. Central nervous system is commonly affected in uremics. The prevalence of moderate to severe cognitive impairment in hemodialysis patients is more than double the prevalence in the general population. These patients could benefit from cognitive assessment before and periodically after dialysis therapy initiation[1]. Reports of NCCT findings in CRF patients, however, have been less well documented.

Materials and Methods

This is a prospective study for a period of one year from Nov. 2016 to oct. 2017 performed in GMC, Jammu. In the present study 64 patients of chronic kidney disease of either sex fulfilling inclusion criteria were enrolled in the study. Subjects under study were subjected to history, physical & clinical examination, various lab. Investigations, X-ray chest, Ultrasound for kidney size & echotexture and NCCT Head

Inclusion criteria: Patients of chronic renal failure (CRF) admitted in general medical wards of GMC Jammu in a state of altered sensorium.

Exclusion criteria

1. Patients with very poor general condition
2. Patients with <18 years age
3. Alcohol intake
4. Significant cardiac, pulmonary, hepatic diseases.

Results

A total of 64 patients enrolled in our study. All subjects were known cases of CKD (already diagnosed) following Nephrology or General Medicine Outpatient Department at Govt. Medical College, Jammu. The observations made in the study are as under:

Table 1: Age distribution of patients (n=64)

Age group (in years)	Number	Percentage (%)
<30	5	7.81
31-40	10	15.62
41-50	26	40.62
51-60	23	35.93

Most of the patients in the study were in the age group of 41-50 (26; 40.62%).

Table 2: Sex distribution of patients (n=64)

Sex	Number	Percentage (%)
Male	36	56.25
Female	28	43.75
Total	64	100

Male to female ratio among the patients was 1.28:1; with males constituting 56.25% and females 43.75%.

Table 3: Distribution of patients according to co-morbidity (n=64)

Co-morbidity	Number	Percentage (%)
Hypertension	55	85.93
Diabetes mellitus	39	60.93
Total	64	100

In the present study of 64 patients of CKD, history of hypertension was present in 58 (85.93%) and history of Diabetes mellitus was present in 39 (60.93%) patients.

Table 4: Distribution of patients according to presenting symptoms (n=64)

Complaint	Number	Percentage (%)
Drowsiness	35	54.68
Hemiparesis	5	7.81
Seizure	4	6.25
Syncope	2	3.125
Irrelevant talking	10	15.62
Others	8	12.5
Total	64	100

Most patients presented with chief complaints of drowsiness (35; 54.68%).

Table 5: Distribution of patients according to GFR (n=64)

GFR (ml/min/1.73m^2	Number	Percentage (%)
<15 (stage V)	53	82.81
15-29 (stage IV)	7	10.93
30-44 (stage IIIa)	2	3.12
45-60 (stage IIIb)	2	3.12

Most of the patients had stage V CKD (53; 82.81%).

Table 6: Distribution of patients according to mode of treatment (n=64)

Mode of treatment	Number	Percentage (%)
Conservative	22	34.37
HD	32	50
PD	10	15.62
Total	64	100

Most patients taken in study were on maintenance dialysis (HD) 42; 65.61%. 32 patients (50%) were on hemodialysis and 10 patients (15.62%) were on peritoneal dialysis. Also 22 patients (34.37%) were on conservative treatment.

Table 7: Types of findings on NCCT Head (n=64)

Findings on NCCT Head	Number	Percentage (%)
Normal	10	15.62
Cerebral atrophy	42	65.62
Ischemic lesions	8	12.5
Haemorrhagic lesions	6	9.3
Endocranial calcification	6	9.3
Others	4	6.25

Most common CT Head finding is cerebral atrophy (42; 65.62%). Other findings included bilateral cerebral hypodensities, bilateral basal ganglia hypodensities, ICSOL, etc. Ischemic stroke was seen in 8 patients (12.5%); out of which 5 patients has lacunar infarcts. Haemorrhagic stroke occurred in 6 patients (9.3%). Ischemic stroke with haemorrhagic transformation was seen in 2 patients. Endocranial calcification including bilateral basal ganglia calcifications were seen in 6 patients. Most common site for haemorrhagic stroke was found to be thalamus (3 patients) followed by basal ganglia (2patients) and cerebral cortex (1patient). NCCT Head was reported normal in 10 (15.62%) patients.

Discussion

Neurological system is involved from several pathological conditions like uremic encephalopathy, dementia, stroke, etc. The increasing prevalence of neurological symptoms has resulted in studies on central nervous system lesions via radioimaging like NCCT Head. Dialysis can directly or indirectly be associated with dialysis dementia, disequilibrium syndrome, aggravations of atherosclerosis, cerebrovascular accidents, etc. Out of 64 patients, 53 (82.81%) had CKD Stage V, 7 (10.93%) had CKD Stage IV, 2 (3.12%) had CKD Stage IIIb, 2 (3.12%) had CKD Stage IIIa.

55 patients were hypertensive and 39 were diabetic. All the patients were presenting with neurological complaints like drowsiness, hemiparesis, facial palsy, seizure, sudden syncope, irrelevant talking, etc.

On NCCT Head, cerebral atrophy was found in 42 patients (65.62%). Out of 22 patients on conservative treatment, 11 patients had cerebral atrophy (50%). Out of 32 patients on hemodialysis treatment, 24 patients had cerebral atrophy (75%). Out of 10 patients on peritoneal dialysis treatment, 7 had cerebral atrophy (70%). Out of overall 42 patients on dialysis treatment, 31 patients had cerebral atrophy (73.8%). Similar observations were made by Cusmano F et al. (1986)[2] and Savazzi G.M et al. (2001)[3].

Moreover, out of 64 patients, 16 patients (25%) were found to have stroke. Out of 16 patients, 8 patients (50%) had ischemic stroke, 6 patients (37.5%) had haemorrhagic stroke and 2 patients (12.5%) had haemorrhagic transformation of ischemic stroke. In a similar study by P. Rama Krishna et. (2009)[4] found stroke due to cerebral infarction in 48.14% and due to cerebral haemorrhage in 40.7% of the patients in a study of 27 patients of stroke with CKD.

Out of 6 patients with haemorrhagic stroke in our study, 3 patients (50%) had thalamic bleed, 2 patients (33.33%) had basal ganglia bleed and 1 patient (16.67%) had subcortical bleed. S. Naresh et al. (2009)[5] also reported distribution of haemorrhagic stroke in CKD as thalamus in 38.46%, basal ganglia in 38.46%, subcortical in 15.38% and cerebellum in 7.69% of the patients.

Furthermore, endocranial calcification (including bilateral basal ganglia calcification, pineal gland calcification, choroid plexus calcification, cortical calcification) was found in 6 patients (9.3%). Savazzi GM et al. (2001)[3] also found endocranial calcification in 9.6% patients in a study of 166 patients.

Moreover, bilateral basal ganglia hypodensities were noted in 2 patients (3.125%). Eun Ja Lee et al. (2007)[6] also studied 4 patients with diabetic mellitus and chronic renal failure who developed sudden choreic movement disorder. Neuroimaging revealed bilateral symmetrical basal ganglia lesions. After hemodialysis, lesions regressed significantly in all 4 patients and this sensorium also improved. In a similar study by Wang HC et al. (2003)[7] studied 12 patients of chronic renal failure with abnormal body movements and documented neuroimaging findings of symmetrical bilateral basal ganglia changes. Out of 64 patients, NCCT Head was reported normal in 10 patients (15.62%).

Conclusion

Neurological manifestations have been frequently reported in patients of chronic renal failure. Patients of CKD have moderate to severe chronic cognitive impairment, yet it is largely undiagnosed. Hemodialysis patients are at high risk of cognitive impairment due to their older age and high prevalence of stroke and cardiovascular risk factors. The early recognition of risk factors associated with stroke in CKD population is imperative. Early interventions may potentially decrease the incidence and associated mortality of stroke in CKD patients (Nadia Kousar et al. 2009)[8].

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