



ORIGINAL RESEARCH PAPER

General Medicine

PREVALENCE OF PERIPHERAL NEUROPATHY IN CHRONIC KIDNEY DISEASE: A PROSPECTIVE STUDY

KEY WORDS: nerve conduction study, sensory motor neuropathy, mortality

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ABSTRACT

Background: Patients with chronic kidney disease (CKD) are frequently afflicted with neurological complications. These complications can potentially affect both the central and peripheral nervous systems. These conditions have significant impact not only on patient morbidity but also on mortality risk through a variety of mechanisms.
Aims and Objectives: To study prevalence of peripheral neuropathy in CKD patients.
Materials and Methods: Hundred CKD patients having age >18 years were studied at Department of general medicine, Gandhi Medical College, & associated Hospitals (Hamidia Hospital) Bhopal from 2017 to 2020. Viral markers, CBC, fasting and post prandial blood sugar, serum electrolytes, serum urea and creatinine, liver function test, serum profile, coagulation profile, ECG, chest X ray and Nerve conduction studies were performed and results were recorded.
Results: CKD was more prevalent in young age group of 20-30 years (29%) followed by 31 to 40 (22%), 41 to 50(20%), 51 to 60(20%) and in male patients (65%). Majority had stage 4 CKD followed by stage 5 and stage 3. Nerve Conduction Study of findings reveals that prevalence of axonal motor neuropathy in upper limbs was in 12%, axonal sensor motor neuropathy in upper limbs was 5%, axonal sensory neuropathy in lower limbs was 10%, axonal sensory motor neuropathy in lower limbs was 21%, demyelination sensory neuropathy in upper limbs was 5% and mixed sensor motor neuropathy in both lower limbs was 14%. Conclusion: Neurological problems are common in CKD which cause significant morbidity and mortality. Early detection and management of these conditions in mild CKD is very important to limit their impact at later stages.

INTRODUCTION

CKD is one of the significant public health problems in worldwide causing decreased quality of life. CKD patients are at increased risk for mortality as well as morbidity due to the numerous complications associated with it.

Neurological complications are major secondary causes of the morbidity and mortality in patients with renal failure. Regardless of improved therapies, neurological complications like peripheral neuropathy, uremic encephalopathy etc. is still major challenges. (K/DOQI 2002)

Peripheral neuropathy is the most common neurological complication of CKD. Major cause of development of neuropathy is the degree of renal impairment, clinically significant neuropathy occur after the glomerular filtration rate (GFR) drops to less than 12 mL/minute. (Brouns R 2004) Present study is to find out the prevalence of peripheral neuropathy in CKD patients.

MATERIALS AND METHODS

Present prospective observational, cross sectional study was performed on 100 patients at Department of general medicine, Gandhi Medical College, & associated Hospitals (Hamidia Hospital) Bhopal from 2017 to 2020.

All patients of chronic kidney disease having age more than 18 years and on maintenance hemodialysis were included whereas patients having age < 18 years were excluded from the present study.

Viral markers, CBC, fasting and post prandial blood sugar, serum electrolytes, serum urea and creatinine, Liver function test, serum profile, coagulation profile, ECG, Chest X ray and Nerve conduction studies were performed and results were recorded.

Nerve Conduction study: Three parameters of nerve conduction studies, latency, and amplitude and conduction velocity were measured by electromyographic (EMG) machine.

All the data analysis was performed using IBM SPSS ver. 20 software. Frequency distribution and cross tabulation was performed to prepare the tables. PRISM and Microsoft excel

was used to prepare the tables. Categorical data was expressed as number and percentage. Chi square test was used to compare the categorical data. Level of significance was assessed at 5%.

RESULTS

CKD was more prevalent in young patients of 20 to 30 (29%) followed by 31 to 40(22%), 41 to 50(20%) and 51 to 60(20%) years of age with male preponderance (65%).

On comparing the CKD stages based on EGFR we observed that majority of the patients had stage 4 followed by stage 5 and stage 3.

USG findings of abdomen showed that majority (38%) of the patients had shrunken and contracted kidney followed by bilateral enlarge polycystic kidneys in 36% and bilateral renal stone with hydronephrosis in 26%. On comparing the neuropathy symptoms we found that the burning sensation was experience by 35% followed by 3% asymptomatic and tingling numbness in 32% patients.

Table 1: Showing prevalence of different neuropathy as per the nerve conduction findings

Nerve Conduction Study (NCS)	Male	Female	Total	P value
Axonal motor neuropathy in upper limbs	8 (12.3)	4(11.4)	12	0.004
Axonal sensorimotor neuropathy in upper limbs	5 (7.7)	0 (0)	5	
Axonal sensory neuropathy in lower limbs	6 (9.2)	4 (11.4)	10	
Axonal sensorymotor neuropathy in lower limbs	15 (23.1)	6 (17.1)	21	
Demyelination sensory neuropathy in upper limbs	3 (4.6)	2 (5.7)	5	
Mixed(A+D)sensorimotor neuropathy in both lower limbs	10 (15.4)	4 (11.4)	14	
Normal study	18 (27.7)	15 (42.9)	33	
Total	65 (100)	35 (100)	100	

DISCUSSION

CKD is a long-term condition caused by damage to kidney. There is no single cause of damage and it is usually irreversible and can lead to poor health. Peripheral neuropathy is a recognized complication of renal failure. Distal symmetrical sensory motor neuropathy is the common type of peripheral neuropathy observed in patients with chronic kidney disease. This study evaluated the peripheral neuropathy in all chronic kidney disease patients

In present study preponderance males (65%) over females (35%) was observed among the CKD patients. Similarly, Jasti et al noted that out of 200 CKD patients 135 (67.5%) patients were male and 65 (32.5%) patients were female. (Jasti DB 2017) In the study of Anbarasu et al out of 60 cases, majority were males 35(58.0%) than females 25 (42.0%). (Duraisamy Anbarasu 2018) Prashanth recorded that out of 100 cases, there were 58 (58.0%) males and 42(42.0%) females. (Sai Prashanth P R 2018)

In present study on comparing the age groups highest number of kidney patients were between 20 to 30(29%) followed by 31 to 40(22%), 41 to 50(20%), 51 to 60(20%), 61 to 70 (8%) and only 1% above 70 years. In Anbarasu et al study majority of patients (40%) were between age group of 21 – 50 years, followed by age group of 50 - 60 years (28.4%), > 60 years (18.4) and only 13.2% patients had age <30 years. (Duraisamy Anbarasu 2018) Prashanth recorded the mean age of the patients was 47.87 years. Most of the patients belonged to the age group 40-70 years. (Sai Prashanth P R 2018) In the study of Babu MM et al most of the patients (28.37%) were in the age group 35-44, followed by 45-54 (22.97%), 25-34 (16.21%) and 65-74 (14.08%). (Babu MM 2015) In present study on comparing the weight of patients most of ate have between 46 to 55 kg (40%) followed by 56 to 65 kg (36%), 35 to 45 kg (18%) and 66 to 72 kg (6%). Mean weight of the sample was 38 kg, mean weight of male subject's was 45 kg and 38 in females. The average weight of Prashanth study population was 61.60 kg. (Sai Prashanth P R 2018)

In current study on comparing the CKD stages based on EGFR we observed that most of patients in the Stage 4 followed by Stage 5, Stage 3. Similarly, in the study of Aggarwal et al majority of patients were in the stage 3 followed by stage 1 and stage 4. (Hari K. Aggarwal 2013) Chao et al in their study observed that majority of kidney patients were in the stage 5 (80%), followed by stage 4 (15%) and 5% patients were in stage 3. (Chao C, 2011) Prashanth compared the CKD stages based on EGFR and noted that most of patients in the Stage 5 (79%) followed by Stage 4 (17%), Stage 3 (4%). (Sai Prashanth P R 2018)

USG findings of abdomen showed that majority (38%) of the patients had shrunken and contracted kidney followed by bilateral enlarge polycystic kidneys in 36% and bilateral renal stone with hydronephrosis in 26%. Similar observations were made by Kim HC, et al i.e. the mean normalized total renal volumes obtained with matrix array transducer 3D sonography in stages 0 and 1 were significantly larger than those in other stages (p < 0.001). The mean normalized total renal volume in stage 5 disease was significantly smaller than the volumes in the other stages (p < 0.001), over all kidney contraction as reported in 49% patients. This result indicates that CKD causes the kidney to shrunken and contract. (Kim HC, 2010)

On comparing the neuropathy symptoms we fund that the burning sensation was experience by 35% followed by 3% asymptomatic and tingling numbness in 32% patients. In a similar study by Pham PC, et al also reported burning sensation and tingling sensation in CKD patients. (Pham PC 2009)

Conduction Study of findings reveals that prevalence of axonal motor neuropathy in upper limbs was in 12%, Axonal sensorimotor neuropathy in upper limbs was 5%, Axonal

sensory neuropathy in lower limbs was 10%, Axonal sensory motor neuropathy in lower limbs was 21%, demyelination sensory neuropathy in upper limbs was 5% and Mixed (A+D) sensorimotor neuropathy in both lower limbs was 14%. Neuropathy was more common in males as compared to females. In similar study Jasti DB et al reported that among 100 patients in Group 2, 70 patients (70%) had definite damage, 22 patients (22%) had early damage, and 8 patients (8%) had no evidence of significant peripheral neuropathy. In diabetic subgroup, definite damage was seen in 47 (94%) patients and 3 (6%) patients had no significant peripheral neuropathy. In non-diabetic subgroup (n = 50), definite damage was seen in 23 (46%) patients, early damage was seen in 22 (44%) patients, and 5 (10%) patients had no significant peripheral neuropathy. The most common patterns of peripheral neuropathy were pure axonal sensorimotor neuropathy (52%) followed by mixed sensorimotor neuropathy pattern (30%), of all 68% patients were male and 32% patients were female. (Jasti DB, 2017) P.Chndra et al also recorded similar finding in patients with neuropathy there is predominant decrease in CMAP amplitudes with relatively decreased conduction velocity, and prolonged distal latency. Significant abnormalities were found in the peak latency, sensory nerve action potential (SNAP) amplitude and conduction velocity (CV) of the sural, median, ulnar nerves. In patients with neuropathy SNAP amplitudes were decreased significantly with relatively decreased conduction velocity. F wave parameters of peroneal, tibial nerves were abnormal in 30 (60%), and of median 17 (34%), ulnar 16 (32%). Lower limb involvement is more common compared to upper limb. Sural nerve involvement is seen in all patients with electrophysiological evidence of neuropathy. (P. Chandra Shekar 2017)

Present study has some limitations in terms of small sample size, single centered and cross sectional due to which the cohort is not the actual replica of the real population. Also in this study we have not factored the smoking and alcohol consumption which have significant impact on kidneys.

CONCLUSION

Based on the results we conclude that CKD was more prevalent in males over females. Most common age group involved was young working age group of 20-30 years. CKD stage 4 was the most common followed by stage 5 and 3. Prevalence of axonal motor neuropathy in Upper Limb was 12%, Axonal Sensory Motor Neuropathy in Upper Limbs was 5%, Axonal Sensory Neuropathy in lower limbs was 10%, Axonal Sensory Motor Neuropathy in Lower Limbs was 21%, Demilination Sensory Neuropathy in Upper Limbs was 5% and Mix (A+B) Sensory Motor Neuropathy in Both Lower Limbs was 14%. To conclude neurological problems are common in CKD which cause significant morbidity and mortality. Chronic conditions such as stroke, cognitive impairment and dementia require long-term risk management strategies to optimize outcomes in CKD patients. High incidences of physical disability in CKD are caused by peripheral neuropathy, Both CNS and PNS complications are most apparent at end-stage CKD. Early detection and management of these conditions in mild CKD is very important to limit their impact at later stages.

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