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Original Research Article

# Evaluation of Peripheral Nerve Dysfunction in Chronic Kidney Disease

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**Abstract**

**Background:** One serious health issue is chronic kidney disease (CKD). The prevalence of CKD is steadily increasing, and it primarily affects the elderly and/or people with diabetes and high blood pressure. Assessing the prevalence of overt and subclinical neuropathy in patients with chronic kidney disease (CKD) as well as the clinical signs of peripheral nerve damage are the objectives of our study.

**Methods:** From January 2025 to June 2025, 74 patients of different ages with chronic renal disease were treated at the medical wards of JLNMCH in Bhagalpur, Bihar, as part of the present observational study. Electrophysiological nerve conduction investigations and clinical nerve dysfunction (motor or sensory symptoms and signs) were used to determine whether peripheral nerve dysfunction was present.

**Results:** 48 of the 74 patients evaluated had peripheral nerve dysfunction, according to an electrodiagnostic investigation, and the proportion of patients with peripheral nerve dysfunction rises with longer duration (more than 5 years).

**Conclusion:** The most prevalent type of peripheral neuropathy seen in CKD patients is distal symmetrical mainly sensory motor neuropathy. The two most prevalent clinical indicators of peripheral neuropathy in CKD patients are loss of vibratory sensation and loss of ankle reflex. Peripheral neuropathy is more common in men with chronic kidney disease (CKD) when creatinine clearance is less than 15 milliliters per milliliter.

**Keywords:** Ankle reflex, chronic kidney disease, Peripheral neuropathy, Sensory-motor neuropathy.



## Introduction

The term "chronic kidney disease" (CKD) refers to a variety of pathophysiological conditions linked to aberrant kidney function and a steady decrease in Glomerular Filtration Rate (GFR).[1].

CKD has become a major cause of morbidity and mortality. In the 2015 Global Burden of Disease Study, kidney disease was the 12th most common cause of death and CKD ranked as the 17th leading cause of morbidity worldwide.[2] The mean (95% confidence interval) global prevalence of CKD is 13.4% and between the stages of 3-5 is 10.6% (9.2-12.2%).[3] In India, the prevalence of CKD is 17.2% and for individual stage 1, 2, 3, 4, 5, as 7%, 4.3%, 4.3%, 0.8% and 0.8% respectively.[4]

In India, it has been recently estimated that the age-adjusted incidence rate of End Stage Renal Disease (ESRD) to be 229 per million population (pmp), and >100,000 new patients enter renal replacement programs annually.[5] The Kidney Disease: Improving Global Outcomes (KDIGO) defines CKD as abnormalities of kidney structure or function, present for >3 months, with implications for health.[6]

CKD has been categorized into 5 stages based on Glomerular Filtration Rate (GFR) and into 3 categories based on albuminuria. CKD is of diverse etiology like diabetic nephropathy, hypertensive nephrosclerosis, glomerulonephritis, chronic interstitial nephritis, and obstructive uropathy, renovascular, genetically mediated.

In western countries, diabetes and hypertension account for over 2/3rd of the cases of CKD.[7] Diabetes and hypertension are also gaining status of potential epidemic in India.[8,9] These two diseases account for 40-60% cases of CKD in India.[10] Neuropathy in CKD is distal, symmetrical, mixed sensory motor polyneuropathy affecting lower limbs greater than upper limbs. The

prevalence of peripheral neuropathy is directly proportional to duration and severity of CKD.

## Materials and Methods

From January 2025 to June 2025, the prospective observational study was carried out at Department of Medicine, Jawaharlal Nehru Medical College and Hospital, Bhagalpur, Bihar. Patients with proved clinical and biochemical parameters in favor of CKD are included in the study.

Inclusion criteria: Patients with CKD not on dialysis, serum creatinine more than 2 mg%, and creatinine clearance <40 ml/mt were included in the study.

Exclusion criteria: Patients with other recognizable risk factors for peripheral neuropathy are excluded from the study. After selecting the patients with reference to inclusion and exclusion criteria, the presence of peripheral nerve dysfunction is assessed in them clinically by means of motor and sensory symptoms and sings.

## Results

A number of patients affected with CKD were 74. Of 74 patients assessed, 48 patients proved to have peripheral nerve dysfunction by the electro diagnostic study. From Table 1, it is learnt that the number of patients affected with peripheral nerve dysfunction is increasing when the duration is increasing (more than 5 years). 48 patients had evidence of peripheral neuropathy by the electrodiagnostic study. 25 patient's revealed sensory motor neuropathy, 12 patients had sensory neuropathy, and 11 patients had motor neuropathy [Table 2]. From Table 3, it is observed that the most common type of neuropathy in chronic disease patients is distal sensory motor neuropathy.

**Table 1: Distribution of peripheral nerve dysfunction in CKD patients versus duration of disease**

| Duration of CKD (year) | Total number of patients | No patients with peripheral nerve dysfunction (%) |
|---|---|---|
| <1 | 11 | 4(36) |
| 1-3 | 21 | 11(52) |
| 3-5 | 22 | 16(73) |
| >5 | 20 | 17(85) |
| Total | 74 | 48 |

**Table 2: Distribution of patients affected with percentage with reference to overt and subclinical neuropathy**

| Overt neuropathy | Subclinical neuropathy | Total |
|---|---|---|
| 14(19%) | 34(46%) | 48(65%) |

**Table 3: Distribution of patients affected with percentage with reference to the type of peripheral neuropathy**

| Sensory-motor | Sensory | Motor | Total |
|---|---|---|---|
| 25(34%) | 12(16%) | 11(15%) | 48(65%) |

**Table 4: Distribution of male and female patients affected with reference to creatinine clearance**

| Creatinine clearance ml/mt | Male (%) | Female (%) |
|---|---|---|
| <15 | 72 | 66 |
| 26-29 | 20 | 25 |
| 30-59 | 8 | 8 |
| Total | 100 | 100 |

A number of patients affected with peripheral neuropathy by the electrodiagnostic study were 48. Of these 48, only 14 patients showed clinical evidence of peripheral neuropathy. Of these 14 patients had both motor and sensory symptoms in the form of loss of ankle jerk and defective vibration sense, 2 patients had numbness both lower limbs, and 1 patient had distal muscle weakness of lower limbs.

72% of males and 66% of females were affected when the creatinine clearance was <15 ml/mt. 20% of males and 25% of females were affected when the creatinine clearance was 15–29 ml/mt. Males were affected more when the creatinine <15 ml/mt.

Both sexes were affected equally when the creatinine clearance between 30 and 59 ml/mt. From Table 4, it is observed that 72% of males and 66% of females with creatinine below 15 ml/mt showed evidence of peripheral neuropathy.

## Discussion

Peripheral neuropathy is a recognized complication of renal failure. These complications can potentially affect both the central and peripheral

nervous systems. Common neurological complications in CKD include stroke, cognitive dysfunction, encephalopathy, peripheral, and autonomic neuropathies. These conditions have a significant impact not only on patient morbidity but also on mortality risk through a variety of mechanisms. Understanding the pathophysiological mechanisms of these conditions can provide insights into effective management strategies for neurological complications.

This review describes clinical management of neurological complications in CKD with reference to the contributing physiological and pathological derangements.[11] Among the 74 patients, 48 patients showed evidence of peripheral nerve dysfunction either clinically or electrophysiological.

36 male patients showed features of peripheral nerve dysfunction and 12 female patients had evidence of peripheral nerve dysfunction. The duration of CKD varied from 3 months to 7 years. Kumar et al. discussed nerve condition study in relation to duration and severity and CKD. They found that reduced suggestive of neuropathy but delayed F-waves and H-reflex are also suggestive of neuropathy.[12]

The common type of peripheral neuropathy observed in this study was distal symmetrical sensory-motor peripheral neuropathy, and incidence of this type of sensory-motor neuropathy was 34%. The incidence of sensory neuropathy was 16% and motor neuropathy was 15%.

The other types of neuropathy mononeuropathy, truncal neuropathies, and cranial neuropathies are not registered in our clinical study. 65% of study population was suffering from CKD with peripheral nerve dysfunction. The peripheral nerves dysfunction was more prevalent in elder age (>65 years) subjects when compared to subjects with age <65 years.[13] Moreover, the results shown that the rate of prevalence of peripheral nerves dysfunction was observed higher in subjects with longer duration of CKD.

## Conclusion

The incidence of peripheral neuropathy is 65% in patients suffering from CKD. Distal symmetrical predominantly sensory motor neuropathy is the most common type of peripheral neuropathy observed in patients with CKD. Loss of ankle reflex and vibratory sensory loss are the most common clinical signs of peripheral neuropathy in patients with CKD. There is a predilection for male in the incidence of peripheral neuropathy in CKD when the creatinine clearance was below 15 ml/mt. The incidence of subclinical neuropathy was about 46% and overt neuropathy is 19%. The incidence of peripheral neuropathy is having linear correlation with severity and duration of renal failure.

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