

## Study of Peripheral Nerve Dysfunction in Chronic Kidney Disease at DMCH, Laheriasarai, Bihar

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### Abstract

**Background:** Chronic renal disease is known to have a consequence called peripheral nerve dysfunction (CKD). The primary aim of the study is the prevalence, clinical manifestation, and severity of peripheral nerve dysfunction in CKD patients admitted to our hospital. Our study's objectives are to assess the prevalence of overt and subclinical neuropathy in CKD patients, as well as the clinical signs and symptoms of peripheral nerve damage.

**Methods:** The research was carried out at the DMCH's Department of Medicine in Laheriasarai, Bihar. Those with established clinical and biochemical indicators of CKD were included in this study, along with patients who were not receiving dialysis.

**Results:** 48 of the 74 patients evaluated by the team were found to have peripheral nerve dysfunction by electrodiagnostic testing, and as the length of the condition increases, so does the number of individuals affected (more than 5 years).

**Conclusion:** Peripheral neuropathy of the distal symmetrical mainly sensory motor variety is most frequently seen in CKD patients. The most prevalent clinical symptoms of peripheral neuropathy in CKD patients are loss of ankle reflex and loss of vibratory sensory function. When the creatinine clearance was under 15 ml/mt, there was a tendency for males to get peripheral neuropathy.

**Keywords:** Ankle Reflex, Chronic Kidney Disease, Peripheral Neuropathy, Sensory-Motor Neuropathy.

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### Introduction

Chronic renal disease is known to have a consequence called peripheral nerve dysfunction (CKD). Patients who exhibit symptoms of peripheral nerve dysfunction typically do not complain about them unless they are expressly asked or looked for. The long-term survival of patients with renal illness is currently improving along with medical treatment.[1] In recent years,

hemodialysis, transplantation, and peritoneal dialysis have revolutionised the prognosis of CKD. Peripheral nerve dysfunction is one of the obvious and treatable complications of CKD, and while patients' lifetime is being extended as a result of recent advancements in the treatment of CKD in India, it is crucial to be aware of these complications. [2] Although the aetiology of CKD is complex,

the clinical symptoms and indications are all the same. The primary aim of the study is the prevalence, clinical manifestation, and severity of peripheral nerve dysfunction in CKD patients admitted to our hospital. The majority of patients who are set to start dialysis for CKD experience neuropathy, which is possibly the most frequent neurological side effect of chronic uremia. This combined sensory-motor polyneuropathy is distal, symmetrical, and more severe in the lower limbs than the upper limbs.

There is a wide range in the rate of development, severity, prominence of motor or sensory signals, and prevalence of dysesthesia. Neuropathy affects men more frequently than women; the reason for this discrepancy is unknown. [3] This or any other neurological indication of the uremic condition does not correspond well with specific serological and biochemical abnormalities (calcium, magnesium, phosphate, urea, and creatinine). The severity and duration of renal illness appear to play a significant role in the emergence of neuropathy. The majority of observers have come to the conclusion that neuropathy results from the accumulation of a dialyzable metabolite after observing that uremic neuropathy improves with hemodialysis. Consider the hypothesis that vitamin insufficiency is a mechanism of neuropathy due to the variable nutritional state of uremic patients [4-6].

Massive vitamin dosages given parenterally and orally haven't been able to clearly alter the progression of neuropathy in unofficial trials. Another theory is that uremic toxins have an inhibiting effect on the endoplasmic flow of transmitters or other crucial nutrients for the brain [7]. This study's objectives

include determining the prevalence of overt and subclinical neuropathy in CKD patients as well as the clinical signs of peripheral nerve damage.

### Materials and Methods

From May 2022 to October 2022, the prospective observational study was carried out at Department of Medicine, Darbhanga Medical College and Hospital, Laheriasarai, Bihar. The study includes patients with established clinical and biochemical indicators of CKD. Patients with CKD who were not receiving dialysis, had serum creatinine levels greater than 2 mg%, and had creatinine clearance less than 40 ml/mt were included in the study. Patients with additional observable risk factors for peripheral neuropathy are disqualified from the research. After deciding which patients to include and exclude, the presence of peripheral nerve dysfunction is clinically evaluated in them using motor and sensory complaints and tests.

### Results

74 patients had CKD and were affected by it. 48 out of the 74 individuals evaluated by the electrodiagnostic investigation had peripheral nerve impairment.

Table 1 reveals that as the time lengthens, a greater proportion of patients experience peripheral nerve impairment (more than 5 years).

The electrodiagnostic examination revealed peripheral neuropathy in 48 individuals. Twelve patients had sensory neuropathy, and eleven had motor neuropathy, according to the results of 25 patients [Table 2]. Distal sensory motor neuropathy is the most prevalent kind of neuropathy in people with chronic diseases, as seen in Table 3.

**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

48 patients were found to have peripheral neuropathy based on the electrodiagnostic examination. Only 14 of these 48 patients exhibited clinical signs of peripheral neuropathy. Of these, 14 patients experienced symptoms that were both motor and sensory, including diminished vibration sensitivity and loss of ankle jerk, numbness in both lower limbs in two patients, and weakness in the distal muscles of the lower limbs in one patient.

When the creatinine clearance was less than 15 ml/mt, 72% of males and 66% of females were affected. When the creatinine clearance was between 15 and 29 ml/mt, 20% of males and 25% of females were affected. When the creatinine was less than 15 ml/mt, men were more affected. When the creatinine clearance ranged between 30 and 59 ml/mt, both sexes

were equally impacted. According to Table 4, peripheral neuropathy was seen in 72% of men and 66% of women with creatinine levels  $\leq$  15 ml/mt.

### Discussion

Renal failure has a known consequence called peripheral neuropathy. Both the central and peripheral nerve systems may be impacted by these issues. Stroke, cognitive impairment, encephalopathy, peripheral, and autonomic neuropathies are common neurological consequences in CKD. Through a number of processes, these disorders have a major effect not only on patient morbidity but also on mortality risk. Effective management techniques for neurological complications can be developed by having a thorough understanding of the pathophysiological mechanisms underlying these diseases. In

light of the physiological and pathological disturbances that contribute to neurological problems in CKD, this review discusses clinical therapy of these issues [8].

48 of the 74 individuals had clinically or electrophysiologically detectable signs of peripheral nerve impairment. 36 male patients displayed signs of peripheral nerve dysfunction, while 12 female patients also shown these signs. CKD could last anywhere from three months to seven years. The investigation on nerve conditions duration, severity, and correlation with CKD was covered by Kumar *et al.* They discovered that while delayed F-waves and the H-reflex are also diagnostic of neuropathy, decreased is suggestive of neuropathy [9]. Distal symmetrical sensory-motor peripheral neuropathy was the most prevalent kind of peripheral neuropathy seen in this investigation, with a 34% incidence rate.

Motor neuropathy occurred 15% of the time, and sensory neuropathy 16% of the time. In our clinical investigation, the other kinds of neuropathy—mononeuropathy, truncal neuropathies, and cranial neuropathies—have not been registered. 65 percent of the study's participants had CKD and peripheral nerve impairment. When compared to participants under the age of 65, the malfunctioning of the peripheral nerves was more common in older subjects (>65 years) [10]. Additionally, the findings indicated that participants with prolonged CKD duration had a higher prevalence of peripheral nerve impairment.

### Conclusion

In patients with CKD, peripheral neuropathy occurs 65% of the time. Peripheral neuropathy of the distal symmetrical mainly sensory motor variety is most frequently seen in CKD patients. The most prevalent clinical symptoms of peripheral neuropathy in CKD patients are loss of ankle reflex and loss of vibratory sensory function.

When the creatinine clearance was below 15 ml/mt, there was a tendency for males to get peripheral neuropathy. About 46% of people have subclinical neuropathy, while 19% have overt neuropathy. The severity and duration of renal failure are linearly correlated with the prevalence of peripheral neuropathy.

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