ORIGINAL RESEARCH PAPER
Volume - 14 | Issue - 03 | March - 2025 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

A STUDY ON PREVALENCE, CLINICAL PROFILE AND PATTERN OF PERIPHERAL NEUROPATHY IN PATIENTS WITH CHRONIC KIDNEY DISEASE

General Medicine

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ABSTRACT

Introduction: Peripheral neuropathy is the common complication of chronic kidney disease (CKD). This study focuses on the prevalence, clinical profile and pattern of peripheral neuropathy in CKD. **Aim:** The aim of our study is to evaluate prevalence and pattern of peripheral neuropathy in patients with chronic kidney disease in correlation with Nerve conduction study. **Methods:** This is a cross sectional study, conducted in patients with chronic kidney disease admitted in medical wards of Government Cuddalore medical College hospital. The presence of peripheral nerve dysfunction is proved by nerve conduction study. **Results:** Out of 100 patients, 64 patients with chronic kidney disease proved with peripheral neuropathy in nerve conduction study. Of which 56 patients had sensory neuropathy, 5 patients had mixed neuropathy and 3 patients had motor neuropathy. **Conclusion:** In patients with chronic kidney disease, we observed that Sensory neuropathy is the most common type of peripheral neuropathy. Prevalence of peripheral neuropathy had correlation with severity of CKD and eGFR.

KEYWORDS

Peripheral neuropathy, Chronic kidney disease, Nerve conduction study.

INTRODUCTION

Chronic kidney disease (CKD) is a significant global health issue, with neurological complications, particularly uremic neuropathy, affecting a large proportion of patients. Peripheral neuropathy (PN) is the most common neurological manifestation, impacting up to 60-100% of individuals with severe CKD or end-stage renal disease (ESRD). Uremic neuropathy typically presents as a slowly progressive, symmetrical, length-dependent neuropathy, starting with sensory dysfunction in the distal limbs and potentially leading to muscle atrophy and weakness. The pathophysiology remains unclear, with theories suggesting the retention of neurotoxic molecules and altered nerve excitability due to factors like hyperkalemia. Despite advancements in dialysis and renal transplantation, the incidence of neuropathy has not significantly decreased, and it remains a major cause of morbidity in CKD patients, with nerve conduction studies often revealing subclinical neuropathy. Renal transplantation is the best treatment option among current therapies available for Uremic polyneuropathy. This study aimed to assess the clinical and electrophysiological prevalence of peripheral neuropathy in CKD patients, considering the progression of the disease and the impact of dialysis treatment.

AIMS AND OBJECTIVES

1. This study aimed to assess the prevalence of Peripheral Neuropathy in chronic kidney disease patients with CKD.
2. To correlate Peripheral Neuropathy in chronic kidney disease patients with chronic kidney disease (CKD).
3. To correlate peripheral neuropathy in chronic kidney disease patients with Nerve conduction studies (NCS)
4. eGFR was calculated using the MDRD Formula. To correlate peripheral neuropathy in patients with chronic kidney disease with eGFR.

MATERIALS AND METHODS

The cross- sectional study was conducted at medical wards of Government Cuddalore medical college and hospital, Chidambaram.

Inclusion Criteria

- Chronic kidney disease (CKD) patients (according to KDIGO CLASSIFICATION) aged > 18 years on treatment with or without dialysis.
- Both males and females.
- CKD for a duration of more than or equal to 1 year.
- CKD with a serum creatinine level >2 mg%.
- Abdominal ultrasonography showed evidence of CKD (increased renal cortical echogenicity, reduced renal cortical thickness, or reduced renal length < 9 cm).

Exclusion Criteria

- History of Diabetes mellitus
- History of Alcoholism
- History of drug-induced neuropathy
- History of Hansen's disease
- History of thyroid disorders.
- Patients with collagen vascular disorders, amyloidosis
- Patients with any primary neurological disorders

After selecting the patients with the reference to inclusion and exclusion criteria, presence of peripheral neuropathy is assessed by Neuropathy symptom score and Neuropathy disability score. Statistical analysis done to assess the prevalence and pattern of peripheral neuropathy in CKD patients.

RESULTS

This study was done in 100 patients with chronic kidney disease. Among 100 patients, 64 patients with chronic kidney disease proved with peripheral neuropathy by nerve conduction study. In which 56 patients had evidence of sensory neuropathy, 5 patients had mixed neuropathy and 3 patients had motor neuropathy.

Patients with Sr. creatinine and eGFR levels 4.43±1.55 and 15.74±6.78 respectively did not have UPN. While those with Sr. creatinine and eGFR levels 5.72±2.08 and 10.87±4.84 respectively were diagnosed with UPN.

The prevalence of UPN was positively correlated with CKD severity. UPN was absent in two, 12, and 22 patients with CKD stages III, IV, and V, respectively. Only one patient in stage III was diagnosed with UPN, while seven and 56 patients in stages IV and V, respectively, were diagnosed with UPN.

Table 1: Distribution Of Peripheral Neuropathy In Patients With CKD

Sensory polyneuropathy	Sensory- motor polyneuropathy	Motor polyneuropathy	Total
56 patients (56%)	5 patients (5%)	3 patients (3%)	64 (64%)

Table 2: Correlation Of CKD Stage And Uremic Polyneuropathy

	UPN +ve	UPN -ve	Total
CKD stage 3	1(1%)	2	3
CKD stage 4	7(7%)	12	19
CKD stage 5	56(56%)	22	78
Total	64(64%)	36	100

Table 3: Correlation Of Serum Creatinine And eGFR With Uremic Polyneuropathy

	UPN- Yes		UPN- No	
	Mean	Standard deviation	Mean	Standard deviation
Serum creatinine	5.07	2.08	4.43	1.55
eGFR	10.87	4.84	15.74	6.78

DISCUSSION

Peripheral neuropathy is a frequent complication among patients with chronic kidney disease (CKD), affecting both the central and peripheral nervous systems. Common nervous system complications includes stroke, cognitive dysfunction, encephalopathy, and both peripheral and autonomic neuropathies, all of which contribute to increased morbidity and mortality risks. In our study of 100 patients, 64 showed evidence of peripheral neuropathy based on nerve conduction studies. The duration of CKD in these patients ranged from less than one year to over five years, with findings suggesting that the prevalence of peripheral neuropathy correlates with the duration of CKD. Distal symmetrical sensory neuropathy was the most common type, with an incidence rate of 56 patients. Mixed sensory motor neuropathy was observed in 5 patients, and motor neuropathy in 3 patients. Truncal and cranial neuropathies were not assessed in this study. Overall, 64% of the participants exhibited peripheral nerve dysfunction, with a higher prevalence found among those with long-term CKD. Prevalence of peripheral neuropathy in CKD increases with progression of CKD, more prevalent in CKD stage 5. Development of Uremic polyneuropathy is increased with eGFR < 15 mL/min/1.73m^2. In haemodialysis patients, UPN was common, but the difference was not statistically significant.

CONCLUSION

Our study of 100 patients aged > 18 years sheds light on the pattern and effects of peripheral neuropathy in this population. We observed a higher prevalence of CKD among individuals aged 31-50, with a near equivalence in prevalence between sexes, albeit with a slight male preponderance, possibly linked to the higher prevalence of CKD risk factors in men. Neuropathic symptoms were prevalent in all patients, ranging from mild to moderate in severity, with burning sensations, numbness, paresthesia, and unsteadiness while walking. NCS revealed sensory neuropathy to be the most prevalent type, followed by mixed and motor neuropathies. Furthermore, our findings suggest that CKD lasting more than two years is associated with an increased risk of progression to more severe stages, particularly stages IV and V. The severity of neuropathic symptoms, as assessed by the NSS and NDS, showed moderate accuracy in predicting the need for hemodialysis. However, NCS appeared to be more accurate in predicting hemodialysis in patients with sensory, mixed, and motor neuropathies. UPN was significantly associated with higher serum creatinine levels and decreased eGFR. UPN increased with CKD progression, peaked in stage V CKD, and showed a strong statistical association with CKD duration. In haemodialysis patients, UPN was common, but the difference was not statistically significant. These findings underscore the importance of comprehensive assessment and monitoring of peripheral neuropathy in patients with CKD, using more than one evaluation method or a combination of methods, particularly as the disease advances, to optimise management and outcomes.

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