



## FREQUENCY OF NEUROPATHY IN CHRONIC KIDNEY DISEASE PATIENTS: A CROSSECTIONAL STUDY

### KEYWORDS

Chronic kidney disease (CKD), nerve conduction study, neuropathy

### Vinod Shende

MD,DNB (Physiology), Assistant Professor, Dept. of Physiology, Mahatma Gandhi Institute of Medical Sciences, Sevagram.

### Ramji Singh

MD (Physiology), Professor and Head, Dept. of Physiology, AIIMS, Patna

### Sachin Pawar

MD(Physiology), Associate Professor, Dept. of Physiology, Mahatma Gandhi Institute of Medical Sciences, Sevagram

### ABSTRACT

The prevalence of chronic kidney disease is increasing day by day. It is associated with various complications, neuropathy is one of them. Neuropathy can be diagnosed by various means, nerve conduction study is most sensitive among them. We performed nerve conduction study on 384 chronic kidney disease patients diagnosed and referred to us by physicians after assessing our inclusion and exclusion criteria. Both males and females of 30 yrs and above were included in the study after obtaining written consent. The study was approved by Institutional ethics committee. All patients were subjected to electrophysiological evaluation using RMS EMG EP Mark-II machine. Our results suggested that out of 384 patients, 289 patients have polyneuropathy as against 25 patients who have mononeuropathy. Thus, we can say that the frequency of polyneuropathy is 75.26% whereas frequency of mononeuropathy is 6.51% among CKD patients.

### INTRODUCTION

A significant change has been seen in the disease pattern between current and previous centuries all over the world. Non-communicable, noninfectious diseases have become the major cause of disability and death, chronic kidney disease is one of them. Chronic kidney disease has emerged as one of the leading causes of chronic disease with 8-16% worldwide prevalence (1, 2, and 3). Chronic kidney disease ultimately leads to several complications, neuropathy is one of them (4, 5). Complications are commonly seen in later stages of CKD especially in end stage renal failure. In majority of patients, the type of neuropathy is distal motor sensory polyneuropathy but the mononeuropathy is also seen in some patients. Neuropathy can be diagnosed by various tools like a questionnaire for the clinical symptoms and electrophysiological examinations like nerve conduction study. A nerve conduction velocity (NCV) test determines how fast electrical signals move through a particular nerve. It is also called as a **nerve conduction study** and is used in the diagnosis of nerve damage or nerve dysfunction (6). Amongst all electrophysiological tests nerve conduction study has the highest specificity (7). The present study is undertaken to check the frequency of polyneuropathy and mononeuropathy among CKD patients by electrophysiological test in rural Indian population.

### MATERIALS AND METHODS:

**Study Design:** It was a cross-sectional study performed on rural population of central India. Patients over and above 30 yrs of age were included in the study. Both male and female patients satisfying the inclusion and exclusion criteria were included in the study. The present study was approved by the Institutional ethics committee and written informed consent was obtained from all study participants.

**Study population and sample size:** total 384 clinically diagnosed patients of end stage renal disease were included in the study. Thorough history was taken from all participants and relevant examination was documented.

**Inclusion criteria:** Our inclusion criterion consists of uremic (end stage renal disease) patients diagnosed by physician after minimum clinical and supportive laboratory investigation with or without clinical evidence of neuropathy.

### Exclusion criteria:

- Electrically sensitive patients
- Patients with a permanent pacemaker or other such implanted stimulators
- Allergy to the electrode or contact material (tape / gel)
- Subjects with reduced levels of consciousness or impaired understanding (8).

### Procedure and Instrument:

The study was performed on RMS EMG EP Mark-II machine in the Clinical Neurophysiology Unit, Department of Physiology. All tests were performed under constant room temperature (30°C) to shortlist the errors. History and clinical examination were recorded in structured format.

### Electrophysiological Evaluation:

#### Motor nerve conduction study:

Motor nerve conduction study involves stimulation of motor nerves at two different sites with maximal stimulus and calculation of distal motor latency, amplitude and conduction velocity. Median, Ulnar, Tibial and Peroneal nerves were tested. Setting was kept at sweep speed 5 ms/D, intensity 2 mV, frequency 2 Hz, filter between 2 Hz to 5 Hz and stimulus strength duration was 100 µs(8).

#### Sensory nerve conduction study:

Sensory NCS are performed by electrical stimulation of a peripheral nerve and recording from a purely-sensory portion of the nerve. The recording electrode is kept more proximally. SNAP and conduction velocity was measured. Setting was kept at sweep speed 2ms/D, intensity 2mV, and frequency 2Hz, filter was between 20Hz to 3 KHz and stimulus strength duration was 100 ms(8).

### RESULTS:

**Table 1: Age wise distribution of patients**

Age Group(yrs)	No of patients	Percentage (%)
30-39 yrs	92	23.96
40-49 yrs	114	29.69
50-59 yrs	140	36.46
≥60 yrs	38	9.90
Total	384	100.0
Mean ± SD	48.25 ± 9.44 yrs(30.71 yrs)	

**Table 2: Gender wise distribution of patients**

Gender	No of patients	Percentage (%)
Male	250	65.10
Female	134	34.90
Total	384	100.0

**Table 3: Prevalence of Polyneuropathy and mononeuropathy**

	Polyneuropathy	Mononeuropathy
Normal	95(24.74%)	359(93.59%)
Abnormal	289(75.26%)	25(6.51%)
Total	384(100%)	384(100%)

A total 384 patients were enrolled for nerve conduction studies. 4 nerves (median, ulnar, tibial and peroneal) were studied bilaterally for motor nerve conduction. 3 nerves (median, ulnar and sural) were studied bilaterally for sensory nerve conduction. 4 nerves were studied bilaterally for late response (median, ulnar, tibial and peroneal).

If NCS is suggestive of neuropathy in 2 or more nerves then it is termed as polyneuropathy. And if only one nerve is affected, it is termed as mononeuropathy. Accordingly we studied all these nerves in all 384 patients and found that 289 patients have polyneuropathy as against 25 patients who have mononeuropathy. Thus, we can say that the prevalence of polyneuropathy is 75.26% whereas prevalence of mononeuropathy is 6.51%.

#### DISCUSSION:

In the present study, a total 384 patients were enrolled for nerve conduction studies. 4 nerves (median, ulnar, tibial and peroneal) were studied bilaterally for motor nerve conduction. 3 nerves (median, ulnar and sural) were studied bilaterally for sensory nerve conduction. 4 nerves were studied bilaterally for late response (median, ulnar, tibial and peroneal). If NCS is suggestive of neuropathy in 2 or more nerves then it is termed as polyneuropathy. And if only one nerve is affected, it is termed as mononeuropathy. Accordingly we studied all these nerves in all 384 patients and found that 289 patients having polyneuropathy as against 25 patients who have mononeuropathy. Thus, we can say that the prevalence of polyneuropathy is 75.26% whereas prevalence of mononeuropathy is 6.51%.

Our findings are comparable with the observation made by Hari K. Aggarwal et al (2013); they studied nerve conduction parameters in 100 CRF patients and reported that 70% of the patients had uremic polyneuropathy. Hee-Kyu Kwon et al (2011) mentioned electrophysiological findings in 112 patients with ESKD undergoing either hemodialysis or peritoneal dialysis. Patients were electrophysiologically tested for peripheral polyneuropathy and carpal tunnel syndrome (it is an entrapment neuropathy and is one of the frequent mononeuropathy). Out of 112 patients 38 (33.9%) were having polyneuropathy, 12 (10.7%) were having CTS and 20(17.9%) were having both CTS and polyneuropathy (9,10). It suggests that authors found 51.8 % prevalence of polyneuropathy as against 75.26 % prevalence of polyneuropathy in our study. Also the prevalence of CTS (mononeuropathy) is 10.7% which is comparable to 6.51% prevalence of mononeuropathy found in our study.

Tilki HE et al (2009) reported electrophysiological findings in 42 patients of chronic renal failure. They performed nerve conduction studies (NCSs) of the median, ulnar, tibial, peroneal, and sural nerves, and QEMG of the tibialis anterior and biceps brachial muscles were performed (11). They found either axonal or demyelination polyneuropathy in 97.6% of the patients as against ours (75.26%).

Our results are similar to that of Janda K et al 2007; who studied motor nerve conduction study, sensory nerve conduction study and late response study parameters in 53 patients on continuous ambulatory peritoneal dialysis (CAPD) and 68 patients on hemodialysis. They reported the polyneuropathy prevalence rate of

77.4% in continuous ambulatory peritoneal dialysis whereas 86.8 % prevalence of polyneuropathy in patients with hemodialysis. Bolton et al 1990 mentioned the polyneuropathy prevalence as 60% in uremic patients undergoing hemodialysis. These results are in similar to ours(12,13).

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