

A Prospective Observational Study on Peripheral Nerve Dysfunction in Chronic Kidney Disease Patients

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Abstract

Introduction: The chronic kidney disease (CKD) is a worldwide public health problem and is a long-term condition caused by kidney damage. The CKD leads to progressive and irreversible destruction of nephron mass, irrespective of cause. Peripheral nerve dysfunction is a recognized complication of CKD.

Aim: The aim of our study was to analyze the peripheral nerve dysfunction in CKDs.

Materials and Methods: This prospective observational study was conducted in headquarters hospital, Dindigul to analyze the peripheral nerve dysfunction in CKDs. Complete neurological examination was done with special emphasis on peripheral nerve examination.

Results: Out of 40 patients, 28 were males and 12 were females. Based on duration of kidney diseases and peripheral nerve dysfunction six patients had duration <1 years. Out of which three had peripheral nerve dysfunction, 11 patients between 1 and 3 years. In that six had peripheral nerve dysfunction, 12 patients between 3 and 5 years. Out of which eight had peripheral nerve dysfunction and eleven patients had duration greater than 5 years. In that nine had peripheral nerve dysfunction. Thirteen patients had sensory motor nerve damage, seven patients had sensory nerve damage, and six patients had motor nerve damage.

Conclusion: From this study, we concluded that if duration of kidney diseases increases then peripheral nerve dysfunction also increases and our study shows that majority were affected with both sensory and motor damage.

Key words: Chronic kidney disease, Peripheral neuropathy, Sensory motor neuropathy

INTRODUCTION

The chronic kidney disease (CKD) is a worldwide public health problem and is a long-term condition caused by kidney damage. The CKD leads to progressive and irreversible destruction of nephron mass, irrespective of cause. It is a well-known fact that patients of CKD are at increased risk of mortality as well as morbidity due to the myriad complications associated with this disease entity. Neurological complications, secondary to the uremic state, contribute largely to the morbidity and mortality in patients with renal failure. CKD is a rapidly growing global health

problem, with a prevalence of 15% in developed nations and peripheral neuropathy is most common complication with kidney disease.^[1]

CKD is defined as renal injury of a more prolonged nature, often leads to progressive and irreversible destruction of nephron mass, irrespective of cause, the eventual impact of severe reduction in nephron mass is an alteration in function of virtually every organ system in the body.^[2] CKD potentially affects all levels of the nervous system, from the central nervous system through to the peripheral nervous system (PNS).^[3] The chronicity and severity of kidney disease appear to be the important cause to the development of neuropathy.

Most of the time, patients who are having features of peripheral nerve dysfunction would not come out with complaints of it unless it is specifically asked or looked for. At present, the medical treatment for kidney disease is

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improving and patient's long-term survival is improving.^[4] Peritoneal dialysis, hemodialysis, and transplantation have revolution the prognosis of CKD in recent periods. As patient's lifespan is prolonged due to recent improvement in the treatment of CKD, it is essential to know about the complication that can occur in patient surviving for long period with CKD, of which peripheral nerve dysfunction is one of the recognizable and treatable complication of CKD.^[5]

The etiology of CKD is varying in nature, but the clinical symptoms and signs are of the same. There are several etiologies for CKD. It can occur due to either a primary kidney disease or as a complication of a multisystem disorder.^[6] DM is the most common cause in developed nations,^[6] whereas inflammatory kidney disease, namely, glomerulonephritis and interstitial nephritis remains the most common causes in developing countries.^[7] DM along with hypertension – the second most common cause – and glomerulonephritis accounts for about 75% of all adult cases.^[8] In young adults a common etiology of CKD is genetic kidney disease.^[8]

Aim

The aim of our study was to analyze the peripheral nerve dysfunction in CKDs.

MATERIALS AND METHODS

This prospective observational study was conducted in headquarters hospital, Dindigul to analyze the peripheral nerve dysfunction in CKDs. Informed consent was obtained from the study population. Patients with proved clinical and biochemical parameters in favor of CKD are included in the study. Complete neurological examination was done with special emphasis on peripheral nerve examination. 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

Out of 40 patients, 28 males and 12 females are presented in Table 1.

Out of 40 patients based on duration of kidney diseases, six patients had duration <1 years, 11 patients had duration

between 1 and 3 years, 12 patients had duration between 3 and 5 years, and 11 patients had duration greater than 5 years [Figure 1].

Out of 40 patients based on duration of kidney diseases and peripheral nerve dysfunction, 6 patients had duration <1 years. Out of which three had peripheral nerve dysfunction, 11 patients between 1 and 3 years. In that six had peripheral nerve dysfunction, 12 patients between 3 and 5 years. Out of which eight had peripheral nerve dysfunction and 11 patients had duration greater than 5 years. In that nine had peripheral nerve dysfunction [Figure 2].

Out of 40 patients, 13 patients had sensory motor nerve damage, seven patients had sensory nerve damage, and six patients had motor nerve damage [Figure 3 and Table 2].

DISCUSSION

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

In our study, majority had duration of CKDs between 3 and 5 years followed by greater than 5 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.^[9] Babu *et al.*^[10] conducted a study on this topic and focused on association of CKD and peripheral neuropathy. In that study impact of age was also observed on neuropathy and its severity. Age >65 years is more prove to peripheral neuropathy in CKD.

Rathnakumar *et al.*^[11] completed a study in 2018 on peripheral dysfunction and CKD and conclude that distal sensory and motor neuropathy our two common types of peripheral neuropathy associated with CKD. In our study, 64.8% of patients have peripheral neuropathy.

Table 1: Gender distribution

Gender	Number of Patients
Male	28
Female	12

Table 2: Type of peripheral neuropathy

Sensory motor	Sensory	Motor	Total
13	7	6	26

Another study was conducted by Arnold *et al.*^[12] reported that CKD is highly associated with neurological complications which may lead to sourbidity and neutrality. May chronic neurological complications such as stroke, dementia, and cognitive impairment were also observed.

In a study by Bolton *et al.*^[13] observed similar findings and reported that a number of peripheral neurological disorders

are associated with CKD. Cause behind this pathology is production of toxins in CKD. Renal transplantation is an option for its recovery.

Another study was conducted by Nielsen *et al.*^[14] and concluded that 77% patients with CKD have peripheral neuropathy and remaining have signs of peripheral neuropathy. In our study slowing of nerve conduction was observed in patient with renal derangement since last 2 years.

Aggarwal *et al.*^[15] conducted a study on peripheral neuropathy in CKD patients and reported that sensory and motor neuropathies are associated with severity of disease or renal function; he observed symptomatic neuropathy in 51% of predialysis patients. Similar study was conducted by Krishnan *et al.*^[16] in 2005 and reported 91% peripheral neuropathy in CKD. This association was reported irreversible that cannot be reversed with early or delayed recovery from renal derangement.

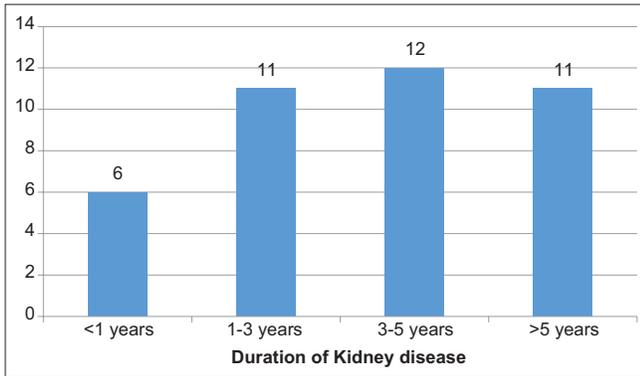


Figure 1: Duration of kidney diseases

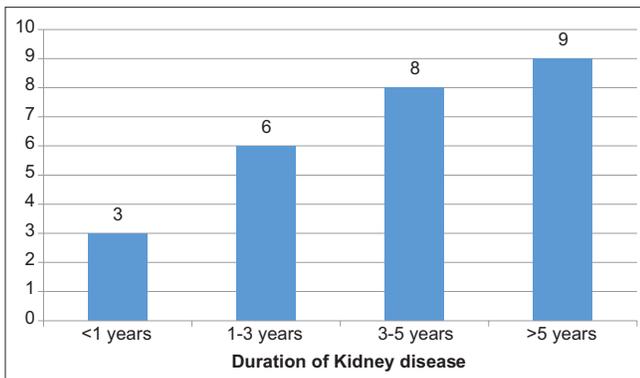


Figure 2: Patients with peripheral nerve dysfunction

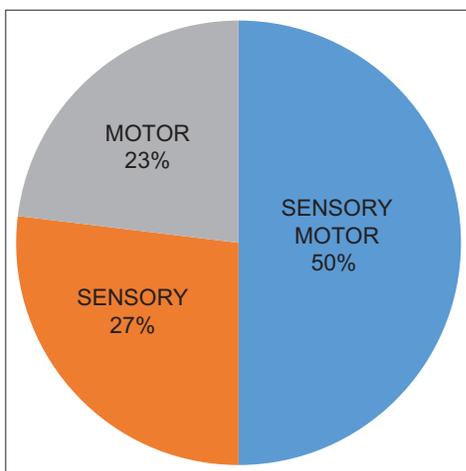


Figure 3: Patients affected with percentage with references to the type of peripheral neuropathy

CONCLUSION

From this study, we concluded that if duration of kidney diseases increases then peripheral nerve dysfunction also increases and our study shows that majority were affected with both sensory and motor damage.

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