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Prevalence of Subclinical Neuropathy in Chrionic Renal Failure (CRF) Patients: A Study in Two Tertiary Care Hospitals, Bangladesh

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Abstract **Original Research Article**

This was a Cross-sectional comparative type of study. The study period extends from January 1, 2007 to December 31, 2007. The study was carried out in the out-patient and indoor patients of Nephrology and Medicine units of Rajshahi Medical College Hospital (RMCH), Rajshahi, Bangladesh. The study aimed to evaluate the occurrence of sub-clinical neuropathy in patients with CRF and its association with Age, Sex and Duration. Neuropathy is a common problem in patients of chronic renal failure. It increases the suffering of the patients who are already burdened by the real problem. The increasing prevalence of CRF has also increased the load of patients with peripheral neuropathy. Early recognition of neuropathy in patients of CRF and appropriate treatment of the condition may decrease the suffering of the patients. The present study was undertaken to evaluate subclinical neuropathy in asymptomatic chronic renal failure (CRF) patients of Bangladesh by electro diagnosis and to explore whether there is any correlation between the duration of CRF and the development of subclinical uremic neuropathy and also to find any relation between age and sex of the patient to the development of neuropathy among CRF patients.

Key words: Nephrology, Neuropathy, Chronic Renal Failure (CRF), Subclinical Uremic Neuropathy.

INRTODUCTION

Chronic renal failure (CRF) is a chronic, progressive, irreversible condition which causes much suffering to the patient. The families, societies and country have to bear a great economic burden to manage patients of CRF. CRF is characterized by overall deterioration of biochemical and physiological function in parallel with the progression of renal failure. The variable symptoms of CRF point to damage of multiple organs, due to retention of compounds normally cleared by healthy kidneys. The nervous system, both central and peripheral, may show changes, mimicking exogenous poisoning or drug overdose [1]. The central nervous system complications of chronic renal failure include encephalopathy, dementia, cerebrovascular disease, osmotic myelinolysis, movement disorders and restless legs syndrome, opportunistic infections, neoplasms, intracranial hypotension and intracranial hypertension. Peripheral nervous system complications include mononeuropathy, polyneuropathy and myopathy [2]. Here only the clinical and electrophysiological aspects of peripheral nervous system involvement due to CRF are reviewed. Peripheral neuropathy is a well-known complication of chronic renal failure which adds more to this problem. It may be due to uremic state or its treatment and contribute largely to the morbidity in patients with renal failure [2]. The present study has been designed for early detection of peripheral neuropathy in CRF patients so that the sufferings of the patient and also the economic burden of the family, society and the country can be reduced. It may occur at any age once the degree of renal failure is sufficient. The reported sex distribution is a male to female ratio of 49:60. It is uncommon in children. No study has examined the role of race in uremic neuropathy [3]. Peripheral neuropathy in chronic renal failure presents as a length dependent, distal sensorimotor polyneuropathy with greater lower limb than upper limb involvement [4]. The prevalence of this condition remains high. The neuropathy remains only mild or subclinical due to improved methods of dialysis and early renal transplantation [5]. Despite the pathology of uremic neuropathy, a slowing of proximal nerve conduction is the earliest neurophysiological finding, and may occur in the absence of a clinically evident neuropathy [6]. The diagnosis of uremic neuropathy should only be made in the context of chronic renal failure of at least several months'

duration. Late responses (H-reflex and F-wave latencies) which reflect the proximal conduction become abnormally prolonged early in the course of chronic renal failure at the time when motor conduction velocity is still normal [7]. The number of patients exhibiting clinical features of uremic neuropathy has recently decreased because of technical improvement in haemodialysis. But the incidence of uremic neuropathy with electrophysiological abnormalities is still high. There has been no consensus on whether it improves with time [8]. Polyneuropathy that occur in patients with chronic renal failure can affect motor, sensory, autonomic and cranial nerves [2]. Uremic neuropathy is a distal sensorimotor polyneuropathy caused by uremic toxins. The severity of neuropathy is correlated strongly with the severity of renal insufficiency. However, uremia and its treatment can also be associated with mononeuropathy at compression sites [3]. In the present study, 30 patients suffering from chronic renal failure and 30 control patients were included. The mean age of both the CRF patients and the controls were 38 years with a range of 18 to 60 years. Table I shows the sex distribution of the cases and control subjects. Male: female ratio in both groups is 8:7. Table II shows that 9 (56.3%) out of 16 male patients and 8 (57.1%) out of 14 female chronic renal failure patients were suffering from subclinical peripheral neuropathy. Table III shows that up to 30 years' age group only 10% patients were affected by peripheral neuropathy. Between age 31-40 years' age group 71.4% patients and between 41-50 years' age group 75.0% patients and >50 years' age group 100% patients are affected by peripheral neuropathy. Study shows that mean (±SD) duration of chronic renal failure was 2.40 ± 1.02 years. Minimum duration of chronic renal failure was 0.5 years and maximum duration was 4.0 years. Table V shows that when the duration of CRF is less than 1 year no patient had features of subclinical neuropathy while patients with duration of CRF more than 2.5 years more than 80% of them had subclinical neuropathy. Table VI shows that 80% of patients having serum creatinine values >15 mg% are suffering from subclinical neuropathy while only 33% patients having creatinine values less than 5mg% have subclinical neuropathy. The number of patients exhibiting clinical features of uremic neuropathy has recently decreased because of technical improvement in haemodialysis. But the incidence of uremic neuropathy with electrophysiological abnormalities is still high. There has been no consensus on whether it improves with time [4]. In this study due to lack of investigation facility and also high cost of investigation procedure. More over the severity of renal failure could not be determined due to investigation constraints. Future researchers may work on this issue involving more patients and the study period should be extended so that updated information is obtained and consequences could be traced out.

OBJECTIVES

a) General objective

- To find out the occurrence of subclinical neuropathy among the CRF patients

b) Specific Objectives

- To find out the correlation of the subclinical peripheral neuropathy with the:
  a. Age of the patient.
  b. Sex of the patient.
  c. Duration of chronic renal failure.

METHODOLOGY AND MATERIALS

This was a cross-sectional comparative type of study. The study period extends from January 1, 2007 to December 31, 2007. the study was carried out in the out-patient and indoor patients of Nephrology, Neurology and Medicine units of Rajshahi Medical College Hospital (RMCH), Rajshahi, Bangabandhu Shiekh Mujib Medical University (BSMMU) & Dhaka Medical College Hospital, Dhaka, Bangladesh. The aim of this study was to find out the occurrence of subclinical neuropathy among the CRF patients. A total number of 60 patients were included in the study. Gender matched 30 patients of chronic renal failure and 30 normal control subjects were included.

RESULTS

In the present study, 30 patients suffering from chronic renal failure and 30 control patients were included. The mean age of both the CRF patients and the controls were 38 years with a range of 18 to 60 years. Table I shows the sex distribution of the cases and control subjects. Male: female ratio in both groups is 8:7. Table II shows that 9 (56.3%) out of 16 male patients and 8 (57.1%) out of 14 female chronic renal failure patients were suffering from subclinical peripheral neuropathy. Table III shows that up to 30 years' age group only 10% patients were affected by peripheral neuropathy. Between age 31-40 years' age group 71.4% patients and between 41-50 years' age group 75.0% patients and >50 years' age group 100% patients are affected by peripheral neuropathy. Table shows that mean (±SD) duration of chronic renal failure was 2.40 ± 1.02 years. Minimum duration of chronic renal failure was 0.5 years and maximum duration was 4.0 years. Table V shows that when the duration of CRF is less than 1 year no patient had features of subclinical neuropathy while patients with duration of CRF more than 2.5 years more than 80% of them had subclinical neuropathy. Table shows that 9 (56.3%) out of 16 male patients and 8 (57.1%) out of 14 female chronic renal failure patients were suffering from subclinical peripheral neuropathy. In the control group of 30 subjects no subclinical neuropathy was found. Here the table shows that as the age of the CRF patient increases more patients were suffering from peripheral neuropathy. In the control group none of the patients were found to be suffering from subclinical peripheral

neuropathy. This table shows that as the duration of chronic renal failure was increasing so more patients were suffering from peripheral neuropathy. So there was direct correlation between the duration of CRF and peripheral neuropathy.

Table-I: Sex distribution of the study subjects (N=60)

Sex	Case (n=30) No. %	Control (n=30) No. %
Male	16 (53.3%)	16 (53.3%)
Female	14 (46.7%)	14 (46.7%)

Table-II: Subclinical Peripheral Neuropathy among cases (N=60)

Sex	No subclinical peripheral neuropathy	Subclinical Peripheral neuropathy present	Total
Male	7 (43.8%)	9 (56.3%)	16
Female	6 (42.9%)	8 (57.1%)	14
Total	13 (43.3%)	17 (56.7%)	30

Table-III: Peripheral neuropathy status on age among cases (N=60)

Age of the patient	Total no. of cases	No subclinical peripheral neuropathy	Subclinical Peripheral neuropathy
18 - 30 yrs.	10	9 (90%)	1 (10%)
31 – 40 yrs.	7	2 (28.6%)	5 (71.4%)
41 - 50 yrs.	8	2 (25.0%)	6 (75.0%)
> 50 years	5	0	5 (100%)
Total	30	13	17

Table-IV: Duration of chronic renal failure in years. (N=60)

Mean	2.4 years
Std. deviation	1.02 years
Range	3.5 years
Minimum	0.5 years
Maximum	4.0 years

Table-V: Peripheral neuropathy status on the duration of CRF (N=60)

Duration of CRF	Total no. of pts.	No subclinical Peripheral neuropathy	Subclinical peripheral neuropathy present
Up to 6 months	3	3 (100 %)	00
>6 months to 1 yr.	2	2 (100 %)	00
>1yr to 1.5 yrs.	5	3 (60 %)	2 (40 %)
>1.5 yrs. to 2 yrs.	3	1 (33.33%)	2 (66.66%)
>2 yrs. to 2.5 yrs.	4	2 (50 %)	2 (50 %)
>2.5 yrs. to 3 yrs.	6	1 (16.66 %)	(83.3 %)
>3 yrs. to 3.5 yrs.	5	1 (20 %)	4 (80 %)
>3.5 yrs.	2	00	2 (100 %)
Total	30	13 (43.3 %)	17 (56.7 %)

DISCUSSION

The present study was undertaken to evaluate subclinical neuropathy in asymptomatic chronic renal failure (CRF) patients of Bangladesh by electro-diagnosis and to explore whether there is any correlation between the duration of CRF and the development of subclinical uremic neuropathy and also to find any relation between age and sex of the patient to the development of neuropathy among CRF patients. To evaluate the presence of subclinical neuropathy in CRF patients we conducted nerve conduction studies of one lower and one upper extremity in asymptomatic CRF patient and compared the result with those of normal subjects. The healthy controls and the CRF patients were matched by gender. 53.3% were male and 46.7% were female. All patients were ambulant and apparently in good built. In this study, gender matched cases and controls were selected for the electrophysiological evaluation of subclinical neuropathy. Age range was from 18 to 60 years. Mean (±SD) age of cases was (38.50±12.63) years and of controls was (38.20±12.62) years and in both cases and controls 53.3% were male and 46.7% were female. Table I shows the sex distribution of the cases and control subjects. Male: female ratio in both groups is 8:7. Table II shows that 9 (56.3%) out of 16 male patients and 8 (57.1%) out of 14 female chronic renal failure patients were suffering from subclinical peripheral neuropathy. This study shows that as the age of the CRF patients were increasing, more and more patients were suffering from peripheral neuropathy (Table-III). In studying the relationship of age of the patient with CRF and development of subclinical

neuropathy, it was seen that subclinical neuropathy was not related to age in the control group of patients. Even the elderly control group of patients did not show any feature of subclinical neuropathy. But in the study group of patients it was seen that as the age of the CRF patients were increasing, more and more patients were suffering from peripheral neuropathy (Table-III). In their study [9] of neurophysiological parameters in patients of CRF found that age of the patients was not associated with the occurrence of polyneuropathy. Table (IV) shows that mean (±SD) duration of chronic renal failure was 2.40 ± 1.02 years. Minimum duration of chronic renal failure was 0.5 years and maximum duration was 4.0 years. Table (V) shows that as the duration of chronic renal failure increases, the more patients of CRF were developing peripheral neuropathy. It is consistent with previous results. Previous studies showed that the chronicity and severity of renal failure is more important to the development of neuropathy [2]. Blood urea and serum Creatinine values are considered as markers of the severity of CRF. But with the advent of dialysis the use of these values as markers of degree of CRF has become less important. In our study it was seen that presence of subclinical neuropathy was related to the level of serum creatinine level.

In a study [10] showed that in patients with moderate renal failure in whom dialysis was not done, serum creatinine elevation correlated with decreased velocity of motor-nerve conduction. But [11] found that individual serologic biochemical abnormalities (calcium, magnesium, phosphate, urea, creatinine, etc.) do not correlate well with uremic neuropathy or any other neurologic manifestation of uremic state. The median nerve DML and MCV might have been affected by median neuropathy because of asymptomatic carpal tunnel syndrome [12]. Previous studies showed the amplitude of sural nerve SNAP was reduced in 75% patient with a less reduction in sural nerve conduction velocity [13]. Our findings of sural nerve conduction abnormality are consistent with the above studies.

LIMITATIONS OF THE STUDY

It was a cross-sectional study with small sample size, which doesn't reflect the scenario of the whole country.

CONCLUSION AND RECOMMENDATIONS

The results of this study suggest that Abnormalities of nerve conduction parameters are detected early in chronic renal failure patients. Sensory nerve conduction parameters are affected more than motor conduction parameters. SNAP (Sensory nerve action potential) are more frequently involved. Abnormal nerve conduction parameters seem to be related to the duration and severity of CRF. Sensory alteration develops in the feet first. Lower extremities are affected more than upper extremities. To establish the ethnic variation of subclinical peripheral nerve dysfunction in chronic renal failure patients, a large – scale long term study is needed.

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