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ORIGINAL CONTRIBUTION
Central and Peripheral Neurological Complications in Chronic Renal Failure, Clinical and Electrophysiological Study.

EDITORIAL
Why Developing medicine?
Francesco Corea

STORIES
My "Trip" to Cabo Verde
Vittorio Giuliano

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CONTENTS

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Why Developing Medicine?

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The road of our project starts in **Perugia**, the city Hospitals and Universities since the 19th century had been a crossroad of cultures, and the gateway to many medical disciplines.

The **larger area of Umbria** somehow reflected this presence **with a strong tradition in hosting foreign students**. Starting from the local integration between residents and students a global mission may be seen in **Medical initiatives** here designed.

The word **developing** has been chosen as part of the title of our project. Although the term developing usually is criticized implying a contraposition between opposites (underdeveloped areas and developed world). It may also be criticized assuming a generic desire to 'develop' towards a traditional 'Western' model of economic development.

The use of the word developing next to medicine was intended to be broad and encompassing basic achievement of medical practice and education in both 'worlds' (the western and the emerging countries) **integrated with the concept of international citizenry**.

The debate between historical relativism and ethnocentrism (eurocentric perspective) provide frontiers where we can venture the great themes offered by the migration movements and emerging national health care systems.

The weapons that we are equipped with a deep faith in liberty, respect for the "other" cultures and the desire to offer a transparent and open discussion of the readers.

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My trip to Cabo Verde

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In 1998 the "**first stone**" **of a new hospital** has been laid in the volcanic island of **Cape Verde**, **Fogo**.

The project was made and **sponsored by the AMSES onlus**. The building grew slowly up and in **2004** the medical activity began. Up to that time, no surgical assistance had been guaranteed to about **30,000 inhabitants** in Fogo with a lot of avoidable sufferings and deaths.

At the beginning of 2009, I was thinking about my life, my job, my family, all my good luck. It was snowing outside and nobody was around. I turned on my computer looking for exotic and hot countries on internet.

Casually I found a web page depicting the **San Francesco d'Assisi hospital in Fogo**, its activity and the need of voluntary medical doctors. After reading each word written on the Web, I sent an e-mail to them.

In September I was in Fiumicino airport leaving for Cape Verde with my sweet (pregnant) wife Sara who is a nurse. The day after we arrived in Fogo; the director Daniela, some doctors from Italy, Cuba and other islands of Cape Verde were waiting for us.

We stayed there for about three weeks, working hard night and day, eating togheter and sleeping in a room leaned on a rocky wall looking forward open Atlantic ocean. Everyday at eight o'clock, patients came to my ambulatory for medical visits and ultrasound scans. During the night hospital was opened to emergency operations and deliveries. It was not easy because of the language and the absence of everything I considered "routinary" till that time.

With the help of the nurses from Cape Verde who had learnt some Italian words, the courtesy of people, the power of sun and the streaming flavour of exotic fruits, **each day became a wonderful experience**. At the end, I felt like I received much more than I had given to those people and that country.

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Central and Peripheral Neurological Complications in Chronic Renal Failure, Clinical and Electrophysiological Study

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ABSTRACT

Background: peripheral Neuropathy (PN) is a well-known complication of chronic renal failure (CRF). The frequency of PN in patients with CRF has declined owing to improvement in the modalities and techniques of dialysis and uremic neuropathy can be considered as an indicator of inadequate treatment by dialysis.

Aim of the work: is to quantitively determine the electrophysiological changes in both peripheral and central nervous system in CRF and to determine the differences between CRF patients on dialysis and those who don't start dialysis yet regarding neuropathy and cognitive impairment.

Materials and Methodology: we studied two groups of patients from the dialysis unit in Sohag faculty of medicine, in addition to a control group. Group I is patients with CRF, who recently diagnosed and the decision of dialysis was taken (10 pts). Group II is on dialysis for more than one year (10 pts). All patients were subjected to full clinical assessment relevant to the peripheral neuropathy, laboratory evaluation, abdominal ultrasonography, nerve conduction studies, electromyography, mini-mental state examination and P300.

Results: Neuropathy is found in 75% of patients. NCS show that both motor and sensory fibers were affected and both axonal degeneration and demyelination were present. Neurophysiological abnormalities and cognitive impairment in group I were more than at group II.

Conclusion: This study clearly demonstrated that neuropathy is very common in CRF patients and neurophysiological abnormalities in group I were more common than in group II. This show the importance of hemodialysis in reduction of uremic neuropathy and its sensory symptoms.

INTRODUCTION

Peripheral Neuropathy (PN) is a well-known complication of chronic renal failure (CRF).The frequency of PN in patients with CRF has declined owing to improvement in the modalities and techniques of dialysis (1). Uremic neuropathy can be considered to be an indicator of inadequate treatment by dialysis (2). It has been pointed out that uremic neuropathy often remains mild or subacute clinically, and detectable only by electrophysiological studies (1). Uremic neuropathy is a distal sensorimotor polyneuropathy caused by uremic toxins. The severity of neuropathy is correlated strongly with the severity of the renal insufficiency. Uremic neuropathy is considered a dying-back neuropathy or central-peripheral axonopathy associated with secondary demyelination. However, uremia and its treatment can also be associated with mononeuropathy at compression sites (1). As with other neuropathies, injury is directly related to axon length; thus, longer axons are affected first, resulting in symptoms that are more prominent in the lower extremities. The sensory symptoms tend to precede the motor

symptoms. Once the sensory defects have moved to or above the knees, the hands may become involved. With the introduction of dialysis and renal transplantation, the spectrum of neurological complications changed. The incidence and severity of uremic encephalopathy, atherosclerosis, neuropathy and myopathy have declined but many patients fail to fully respond to dialytic therapy (1).

Neurophysiology:
Nerve conduction study (NCS) is a sensitive test for diagnosis of neuropathy in patients with uremia (3). In compressive mononeuropathy, slow conduction velocity is found across the compression site. Prolonged F-wave latencies of tibial and peroneal nerves and prolonged H reflexes are the profound and reproducible abnormalities in patients with CRF (4). Needle electromyography revealed minimal or absent fibrillation or positive sharp wave. Only more advanced cases of uremic neuropathy lead to predominantly distal muscle denervation (5).

Cognitive impairment and encephalopathy:
There's also central affection of CRF which can be discovered by P 300 potential study (6). Anatomic, physiologic, and neurochemical disturbances of the brain may develop secondary to renal diseases, with consequent cognitive dysfunction (7). Several workers have reported reduced mental alertness, decreased concentration, memory impairment, and reduced perceptuo-motor coordination among CRF patients. The memory deficits have been directly related to the level of serum creatinine, as patients with creatinine level greater than 10 mg/dl performed less well on continuous memory tasks than healthy controls (8).

Aim of the work:
1. To quantitively determine the electrophysiological changes in both peripheral and central nervous system (cognition) in CRF, severity and types (demyelinating, axonal and mixed) of neuropathy.
2. To determine the frequency of different neurophysiological parameters in CRF patients.
3. To determine the differences between CRF patients on dialysis and those who don't start dialysis yet regarding neuropathy and cognitive impairment.
4. To assess the relation between serum creatinine and clinical neuropathy.

Materials and Methodology
Two groups of patients were taken from the dialysis unit in Sohag faculty of medicine, in addition to a control group, all cross matched in age and sex. Oral consent was obtained from the study participants. The first group is patients with CRF, who recently diagnosed and the decision of dialysis was taken (10 pts). The second group is on dialysis for more than one year (10 pts).
Most of causes of PN were excluded clinically and by investigation such as liver disease, collagen disease (Rheumatoid arthritis, Systemic lupus erythematosis), diabetes mellitus, tuberculosis, drugs induced, alcoholism and hereditary peripheral neuropathy.
Most of causes of cognitive impairment were excluded such as primary neurological or psychiatric disorder, hepatic disease, ingested alcohol during the preceding 1 month, consumed centrally acting drugs, accelerated hypertension, severe anemia (Hb <7 gm/dl), known myocardial infarction/unstable angina, hearing impairment, active collagen vascular disorders or vasculitis requiring use of cytotoxic drugs or steroids (at doses greater than 10mg prednisone/day), or were on treatment with recombinant human erythropoietin (to exclude its effects on P300).

Statistical analysis
Data were registered and analyzed using the statistical package SPSS. P values <0.05 were considered statistically significant. Descriptive statistics (e.g., mean, standard deviation, frequencies, and percentages) were calculated and analysis was performed using the student's t-test, Chi- square (x2) and correlation coefficient (r). Pearson's correlation was used when appropriate.

All patients were subjected to:
1- Full clinical assessment (general, abdominal and neurological), the neurological evaluation including a history and neurological examination which was relevant to the peripheral neuropathy. A history to elicit sensory or motor symptoms

of neuropathy and a neurological examination testing for pin prick sensibilities, joint position, muscle strength and deep tendon reflexes.
2- Laboratory evaluation (blood sugar, renal function tests, liver function tests and hemoglobin).
3- Abdominal ultrasonography was done for all patients to assess the kidney size, echogenicity, liver assessment.
4- Nerve conduction studies were done for the right and left median, ulnar, common peroneal and posterior tibial nerves.
5- For sensory nerves (median and ulnar) distal latencies, sensory conduction velocities and peak to peak amplitude were measured.
6- For motor nerves (median, ulnar, common peroneal and posterior tibial nerves) distal latencies, motor conduction velocities, baseline to peak amplitude and F-wave latencies were measured.
7- EMG of selected muscles.
8- Mini-mental state examination.
9- P300 to assess cognitive function.

RESULTS

Demographic Data

Table 1 shows the demographic Data and clinical manifestations of neuropathy in the three studied groups.
The age "mean ± SD" in group I was 41.4±12.5, in group II was 42.6±10.4 and in control group was 42.1±12.4 and the difference among the three groups was statistically insignificant.
The duration of renal disease in months "mean ± SD" of group I was 2.75±1.9, that of group II was 65.2±36.96.

Clinical manifestations

Clinical manifestations of neuropathy among all examined patients were found in 15 of 20 patients (75%). These Clinical manifestations were 60% at group I, while 90% at group II as shown at table (1).

Symptoms:

Table 1 show the symptoms of peripheral neuropathy in two groups of renal diseases, distal paresthesias (tingling and numbness) in the upper and lower limbs were present in 40% of patients of group I and in 20% of patients of group II with statistically significant difference (P=0.002).
Weakness in upper limbs were present in 10% of patients of group I, in 20% of patients of

Table **1**: Demographic Data and clinical manifestations of neuropathy in the three groups.

	Not dialysis (n= 10)		Dialysis (n = 10)		P value	
	no	%	no	%	Value	Comment
Duration of illness (in months)	2.750±1.9381		65.200±36.96		-	-
Age	41.40±12.589		42.60±10.36		-	-
Clinical neuropathy	**6**	**60.0%**	**9**	**90.0%**	**0.000001**	**Significant**
Symptoms of neuropathy						
TN at UL	**4**	**40.0%**	**2**	**20.0%**	**0.002**	**Significant**
TN at LL	**4**	**40.0%**	**2**	**20.0%**	**0.002**	**Significant**
Cramp at LL	**2**	**20.0%**	**3**	**30.0%**	**0.000005**	**Significant**
Weakness at UL	**1**	**10.0%**	**2**	**20.0%**	**0.00001**	**Significant**
Weakness at LL	**1**	**10.0%**	**3**	**30.0%**	**0.0000**	**Significant**
Signs of neuropathy						
Gloves hypothesia	**5**	**50.0%**	**1**	**10%**	**0.00**	**Significant**
Stocks hypothesia	**6**	**60.0%**	**2**	**20.0%**	**0.00**	**Significant**
Diminished reflexes at UL	**8**	**80.0%**	**1**	**10.0%**	**0.00**	**Significant**
Diminished reflexes at LL	**8**	**80.0%**	**3**	**30.0%**	**0.00**	**Significant**
Muscle wasting at UL	**0**	**0.0%**	**0**	**0.0%**	**-**	**-**
Muscle wasting at LL	**0**	**0.0%**	**0**	**0.0%**	**-**	**-**

group II with statistically significant difference (P=0.00001) whereas weakness in lower limbs were present in 10% of patients of group I, in 30% of patients of group II with statistically significant difference (P=0.0000).
Distal cramps in upper limbs were not present in all patients of the study, but distal cramps at lower limbs present in 20% of patients of group I, in 30% of patients of group II with statistically significant difference (P=0.000005).
Signs:
As shown in table 1, glove hyposthesia was present in 50% of patients of group I, 10% of patients of group II with statistically significant difference (P=0.000005).

As regard stock hyposthesia, it was present in 60% of patients of group I, 20 % of patients of group II with statistically significant difference (P=0.000005). Lost or diminished deep reflexes were detected in the upper limb in 80% of patients of group I and in 10% of patients of group II with statistically significant difference (P=0.000005). Lost or diminished reflexes at lower limbs were detected in 80% of patients of group I and in 10% of patients of group II with statistically significant difference (P=0.000005).

Nerve Conduction Study (NCS):
Table 2 show that the most frequent nerve NCS abnormalities is reduction of motor conduction velocity (MCV) of left median and right ulnar nerves (55% of all CRF Patients), followed by reduction of MCV of right median, left ulnar and right and left posterior tibial nerves (50% of all CRF Patients), equal to reduction of amplitude of right and left posterior tibial nerves and reduction of sensory conduction velocity of left ulnar nerve (50%). Also table 2 shows that prolonged F-wave latency is recorded in 45% of all CRF patients.
Comparison between patients not on dialysis (group I) and patient on dialysis (group II):-
The results show that the number of affected neurophysiological abnormalities at group I more than at group II specially at the sensory conduction study which were statistically significant in most values.

Electromyography (EMG) study:
Neuropathic electromyographic changes in the form of fibrillations and positive waves at rest, giant wave on moderate contraction and poor interference was detected in many cases of this study.
Neuropathic changes were more predominant at lower limbs than upper limbs Fibrillation at rest was present only at lower limbs, not at upper limbs. Giant waves were present in 40 % of all patients of CRF at lower limbs and in 25 % at upper limbs.

Cognitive impairment
The results (table 2) show that 40% of all patients of CRF had reduction of MMS score. Patients on hemodialysis (group II) reduction in the MMS by 30% while patients without dialysis (group I) show reduction by 50%. The P300 latency was prolonged in 45% at all patients of CRF, with mean(±)standard deviation (335±27.8).
Correlation between serum creatinine and neuropathy.

Table 2 shows that there is statistically significant positive correlation between serum creatinine and clinical neuropathy.

DISCUSSION

Incidence of neuropathy in patients with chronic renal failure:-

We found that neuropathy is very common and 15 patients of 20 patients (75%) had evidence of neuropathy either clinical or electrophysiological as reported in many previous studies (1,4,9).

Clinical Manifestations at all C.R.F. Patients

A-Symptoms
We have found that in the majority of cases the neuropathy was subclinical and only mild symptoms in the form of mild cramps, paresthesia and numbness were found in this study while free patients show neurophysiological abnormalities as reported by other studies (1).
Distal paresthesias (tingling and numbness) in upper limbs were present in 30 % of all patients of CRF and in lower limbs were present in 30

Table **2**: Neurophysiological findings, cognitive functions and creatinine level in the three groups.

		Not dialysis (n= 10)		Dialysis (n = 10)		P value	
		no	%	no	%	Value	Comment
Right median nerve motor	DL	5	50%	3	30%	0.003	Significant
	MCV	4	40.0%	6	60%	0.004	Significant
	F-wave	3	30%	6	60%	0.00002	Significant
Right median nerve sensory	DL	4	40.0%	1	10.0%	0.000001	Significant
	SCV	3	30.0%	0	0.0%	0.000	Significant
Right ulnar nerve motor	DL	5	50.0%	3	30.0%	0.003	Significant
	MCV	6	60.0%	5	50.0%	0.155	Not significant
Right ulnar nerve sensory	DL	3	30.0%	3	30.0%	1.00	Not Significant
	SCV	4	40.0%	2	20.0%	0.005	significant
Left median nerve motor	DL	5	50.0%	4	40.0%	0.155	Not Significant
	MCV	5	50.0%	6	60.0%	0.155	Not significant
Left median nerve sensory	DL	5	50.0%	2	20.0%	0.000008	Significant
	SCV	3	30.0%	1	10.0%	0.0004	Significant
Left ulnar nerve motor	DL	4	40.0%	4	40.0%	1.00	Significant
	MCV	4	40.0%	6	60.0%	0.004	Significant
Left ulnar nerve sensory	DL	5	50.0%	4	40.0%	0.155	Not Significant
	SCV	3	30.0%	7	70.0%	0.000	significant
Right common p. nerve	DL	1	10.0%	0	0.0%	0.001	Significant
	MCV	3	30.0%	6	60.0%	0.00002	Significant
	Amp.	4	40.0%	5	50.0%	0.155	Significant
Left common p nerve	DL	0	0.0%	0	0.0%	-	-
	MCV	4	40.0%	5	50.0%	0.155	Not significant
	Amp.	5	50.0%	3	30.0%	0.00001	Significant
Rt PTN nerve	DL	5	50.0%	2	20.0%	0.00008	Significant
	MCV	4	40.0%	6	60.0%	0.004	Significant
	Amp.	5	50.0%	5	50.0%	1.00	Not significant
Left PTN nerve	DL	6	60.0%	2	20.0%	0.000	Significant
	MCV	6	60.0%	4	40.0%	0.004	Significant
	Amp.	6	60.0%	4	40.0%	0.004	Significant
EMG LL	At rest	1	10.0%	0	0.0%	0.00003	Significant
	Giant	5	50.0%	3	30.0%	0.000	Significant
	Interf.	3	30.0%	4	40.0%	0.000	Significant
EMG UL	At rest	0	0.0%	0	0.0%	-	-
	Giant	3	30.0%	2	20.0%	0.00000005	Significant
	Interf.	4	40.0%	3	30.0%	0.000	Significant
Cognitive functions	MMS	5	50.0%	3	30.0%	0.003	Significant
	P 300	5	50.0%	4	40.0%	0.155	Not Significant
Mean of P300 latency.		335.0	27.8	319.4	26.00	0.185	Not significant
Creatinine		14.55	4.79	7.35	2.05	0.00	Significant

%. Distal cramps in lower limbs were present in 25 % all patients. Distal weakness at upper limbs was present in 15 % of all patients while 20 % of all patients complaining about weakness of lower limbs as reported by other studies (10).

Sensory symptoms were more obvious than motor symptoms in contrast to other studies (11) which show that motor symptoms are more common than sensory symptoms. Paresthesia and burning feet syndrome are the most common sensory symptoms but their prevalence is considerably lower than the prevalence of cramps and restless legs syndrome. Paresthesia is an early symptom of uremic neuropathy. The prevalence of these symptoms in different studies varies from 6% to 32 (12,13).

B-Signs

Glove hyposthesia was present in 30% of all patients of CRF and stock hyposthesia in 40%. Lost or diminished deep reflexes were detected in 45% of all patients at the upper limb and in 55% at

lower limbs. The most common clinical sign was abnormal Achilles reflex. From the above results we have found that signs of peripheral neuropathy are more frequent in the lower limbs than the upper limbs as reported by other studies (9,11).

Comparison between patients not on dialysis(group I) and patient on dialysis(group II) :-

We noticed that patients of group I had higher percentage of the clinical manifestations than group II (tingling and numbness, gloves and stocks hypothesia and diminished reflexes) with statistically significant difference in agreement with other studies (2) and in contrast to D. Jurcic et al., 2008 (11) who studied clinical course of uremic neuropathy on long term hemodialysis patients and reported that no significant effect of dialytic age on clinical manifestations.

These results showed that weakness at upper limbs and lower limbs in group II more than group I (20% vs. 10% and 30% vs. 10% respectively) which could be explained by the difference in mean of duration of illness between both groups (group II; 65.2 month, group I; 2.75 month) which lead to myopathy which can't be discovered by EMG but dignosed by muscle biopsy (1).

Results show that cramps at lower limbs in group II are more than group I (30% vs 20%) which was common during dialysis sessions at suction of fluids which cause hypervolaemia leading to osmolarity differences between extra-cellular fluid and neural cell (9).

Nerve Conduction Study

The most frequent nerve conduction study (NCS) abnormalities at this study was reduction of motor conduction velocity (MCV) of left median and right ulnar nerves (55% of all CRF Patients), followed by reduction of MCV of right median, left ulnar and right and left posterior tibial nerves (50% of all CRF Patients), equal to reduction of amplitude of right and left posterior tibial nerves and reduction of sensory conduction velocity of left ulnar nerve (50%).

These results in agreement with Ogura et al., 2001 (5) which showed more abnormalities at upper limbs than lower limbs, this could be explained by the entrapment neuropathy which occur at the wrist joint on the median nerve giving the carpal tunnel syndrome and damage to the ulnar nerve can occur by uremic tumoral calcinosis at the wrist, in Guyon's canal (14).

Therefore, the effect of entrapment neuropathy on the median nerve impedes evaluation of the severity of uremic neuropathy using the upper extremities. The lower extremities allow precise evaluation of the severity of uremic neuropathy because they rarely develop tarsal tunnel syndrome. So results of nerve conduction study showed frequent neurophysiological abnormalities in contrast to Hojs-Fabjan and Hojs 2006 (4).

From the frequent neurophysiological abnormalities in this study was prolonged distal latency of F-wave (45% of all CRF patients) which was in agreement with Tilkia et al., 2007 (1) which reported prolonged F- wave distal latency in 42.5% of their patients. In contrast to Hojs-Fabjan and Hojs 2006 (4), who reported that prolonged F-wave distal latency was the highest percentage (up to 82%) of pathologic values followed by slower sensory conduction velocity of ulnar and median nerves. The F-waves are useful in detecting subclinical polyneuropathies, since they reflect the function of the entire motor axon and the excitability of the soma, whereas other parameters of NCS provide information only about certain segments of the nerve.

These results suggest that both motor and sensory fibers were affected and that both axonal degeneration and demyelination are present in uremic polyneuropathies.

Comparison between patients not on dialysis (group I) and patient on dialysis(group II):-

The results show that the neurophysiological abnormalities at group I are more than at group II especially at the sensory conduction study which were statistically significant in most values. This show the importance of hemodialysis in reduction of uremic neuropathy and its sensory symptoms. Many studies reported that uremic neuropathy can be considered to be an indicator of inadequate treatment by dialysis (2), whereas others reported that severity of uremic neuropathy remains unchanged during hemodialysis or increase of dialytic age leads to deterioration of neurophysiological findings specially in long

term hemodialysis (5,11), so the dilemma of whether an improvement in dialysis adequacy would also improve peripheral neuropathy remains.

Electromyography (EMG) study:
Neuropathic electromyographic changes in the form of fibrillations and positive waves at rest, giant wave on moderate contraction and poor interference was detected in many cases of this study. Neuropathic changes were more predominant at lower limbs than upper limbs. Fibrillation at rest was present only at lower limbs, Tilkia et al., 2007 (1) reported no fibrillation at rest and giant waves were present in 37.5% of patients. In the present study, giant waves were present in 40% of all patients of CRF at lower limbs and in 25% at upper limbs. Neuropathic EMG reflects the axonal element in the pathogenesis of neuropathy. Together with the prolongation of the F-wave latencies, the neuropathy of renal failure is both axonal and demyelinating, however the axonal element is the predominant.

Cognitive impairment
The Mini-Mental State (MMS) examination is one of the most commonly used psychometric tests for detecting cognitive impairment and following cognitive changes over time. The results of this study showed that 40% of all patients of CRF had reduction of MMS score as reported by Ogunrin et al., 2006 (15) that memory and perceptuo-motor performance are impaired in nigerians with chronic renal impairment and Madan et al., 2007 (6) who showed that increasing severity of CRF is associated with progressive cognitive decline. In this study, patients on hemodialysis (group II) had reduction in the MMS by 30% while patients without dialysis (group I) had reduction by 50%. The P300 latency was prolonged in 45% at all patients of CRF, with mean(±) standard deviation (335±27.8) as reported by other studies (7). In this study, we noticed that patients with reduction in MMS (40%) were less than patients with prolonged P300 latency (45%), this show that there is cognitive impairment in uremic patients who are asymptomatic as reported by others (6,16). In this study, 40% of group II patients (on hemodialysis) had prolonged P300 latency in contrast to 50% of group I patients as reported by other studies (7,17) and this show the effect of hemodialysis in improving cognitive impairment in uremic patients.

Correlation between serum creatinine and neuropathy
In this study, there was statistically significant positive correlation between serum creatinine and clinical neuropathy as reported by others (4).

Conclusion
In this study we have found that neuropathy is very common and 15 of 20 patients (75%) had evidence of neuropathy either clinical or electrophysiological. In the majority of cases the neuropathy was subclinical and only mild symptoms in the form of mild cramps, paresthesia and numbness were found while free patients show neurophysiological abnormalities. The clinical manifestations of uremic neuropathy were common at lower limbs than upper limbs and the sensory manifestations were more common than motor manifestations. The results of NCS show that both motor and sensory fibers were affected and that both axonal degeneration and demyelination were present in uremic polyneuropathies. EMG show neuropathic changes, reflecting the axonal element in the pathogenesis of neuropathy, and these changes were more predominant in lower limbs than upper limbs and in group I more than group II. There's a positive correlation between clinical neuropathy and serum creatinine.
The results of this study show that neurophysiological abnormalities at group I were more than at group II, specially the sensory conduction studies. This show the importance of hemodialysis in reduction of uremic neuropathy and its sensory symptoms. In this study, cognitive impairment is common in uremic patients and improved by hemodialysis.

Conflict of interest:
no any potential conflict of interest.

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