CLINICAL NEUROPHYSIOLOGY AS AN OBJECTIVE AID FOR EVALUATION OF LIMB DISABILITY

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Abstract: Background: Weakness or paralysis underlying disability of limb may be due to damage to upper motor neurons, lower motor neurons, the neuromuscular junction or the muscle. **Aim & Objectives**: To find out the neuropathies and frequencies of particular nerve involvement in limb disability as well as to compare and find out the level of significance of the change in latency, duration, amplitude and conduction velocity of CMAP/SNAP of affected nerves. **Methods**: This is observational study which includes 692 patients coming to nerve conduction study OPD referred from Institutional disability evaluation board. Patient's age, sex, height and weight were recorded. Nerve conduction study test was carried out for motor and sensory nerves. Statistical analysis was done using paired and unpaired T tests. 'p'<0.05 (*) denotes that difference is statistically significant and 'p'<0.01 (**) denotes highly significant difference. **Results**: Significant ('p'<0.01) reduction in amplitude, duration and conduction velocity of CMAP/SNAP of most of the nerves was seen. Significant ('p'<0.05) prolongation of latency of CMAP/SNAP was also seen in few nerves. These changes are suggestive of axon loss neuropathy which is an advanced type of neuropathy. **Conclusion**: Lower motor neuron disease is causative factor for disability or weakness of limb in greater percentage of patients coming to Institutional disability evaluation board and can be evaluated by nerve conduction study (NCS) test.

Key words: Nerve Conduction Study, Neuropathy, Disability, Handicap certificate, Weakness of limb

Abbreviations: NCS- Nerve Conduction Study, CMAP- Compound Muscle Action Potential, SNAP- Sensory Nerve Action Potential

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Introduction:

Polio, communicable and congenital diseases are still major problems adding to the number of disabled. In addition rapid industrialization, mechanization of farming and increase in vehicular traffic has increased the number of accidents. At present disability evaluation in India is needed to award compensation, stipends, employment, conveyance allowance, travel concessions, tax-deduction benefits, admission to various courses etc. to the disabled. From time to time statutory provisions have been made to award compensation due to disability. These statutory provisions are: Workman's Compensation Act, E.S.I. Act, M.V.I. Act, Railways Act etc. [1, 2]

Medically, disability is physical impairment and inability to perform physical functions normally. Legally, disability is a permanent injury to body for which the person should or should not be compensated. [1, 2] We have confirmatory objective test for evaluation of disability of CNS (EEG, CT scan), hearing (Audiometry), vision (Opthalmoscopy, retinoscopy) but unfortunately not for limb disability. While doing evaluation of disability of limbs bony abnormalities can be detected on X-ray but currently we don't use any objective test to detect abnormality in muscles and nerves. The criteria to decide percentage of disability are deformity, range of motion, muscle strength, pain, loss of sensation etc. which are subjective criteria. That is why malingering is not a rare thing to get Disability / handicap certificate which has a great benefit in education, job appointment and what not.

Weakness or paralysis may be due to damage to upper motor neurons, lower motor neurons, the neuromuscular junction or the muscle. If we implement nerve conduction study in these

patients, then we can evaluate abnormalities in nerves, after exclusion of this what remains to be evaluated is either muscles(by Electromyography) or upper motor neuron i.e. CNS(by CT scan or Electroencephalography) involvement.

Aims and Objective:

The main objectives of the study are:

1. To find out the neuropathies underlying limb disability.
2. To find out frequencies of particular nerve involvement in various disabilities.
3. To compare and find out the level of significance of the change in Latency, Duration, Amplitude and conduction velocity of CMAP/SNAP of nerves of disabled limb with that of normal limb in cases of unilateral limb weakness.
4. To compare and find out the level of significance of the change in Latency, Duration, Amplitude and conduction velocity of CMAP/SNAP of nerves of subjects with abnormal NCS with that of normal NCS in cases of bilateral limb weakness.

Methodology:

This is Observational study which includes 692 patients coming to nerve conduction study OPD referred from Institutional disability evaluation board, SVN GMC, Yavatmal. Approval was taken from Institutional Ethics Committee to conduct this study. Patients incompatible for Nerve conduction study due to: edema or wound on limb under evaluation, pregnancy, artificial pacemaker implanted in heart or uncooperative for nerve conduction study were excluded. Proper written informed consent of patient was taken before starting Nerve conduction study testing. Patient's age, sex, height and weight were recorded. Nerve conduction study test were carried out with RMS EMG/NCV machine (Model: Aleron 201 with 2 channels, Make: Recorders and Medicare system)

Motor nerve conduction studies [3]

Motor studies are performed by electrical stimulation of a nerve and recording the compound muscle action potential (CMAP) from surface electrodes overlying a muscle supplied by that nerve. The active electrode is placed over the muscle belly and the reference over an electrically inactive site (usually the muscle tendon). A ground electrode is also placed somewhere between the stimulating and recording electrodes providing a zero voltage reference point. The CMAP is a summated voltage response from the individual muscle fiber action potentials. The shortest Latency of the CMAP is the time from stimulus artifact to onset of the response and is a biphasic response with an initial upward deflection followed by a smaller downward deflection. The CMAP Amplitude is measured from baseline to negative peak (the neurophysiological convention is that negative voltage is demonstrated by an upward deflection) and measured in millivolts (mV). Fastest motor nerve conduction velocity (m/s) is distance between stimulation site 1 and 2(mm) divided by [Latency site 2 – Latency site 1 (ms)].

Sensory conduction studies [3]

The sensory nerve action potential (SNAP) is obtained by electrically stimulating sensory fibers and recording the nerve action potential at a point further along that nerve. Once again the stimulus must be supramaximal. Recording the SNAP orthodromically refers to distal nerve stimulation and recording more proximally (the direction in which physiological sensory conduction occurs). Antidromic testing is the reverse.

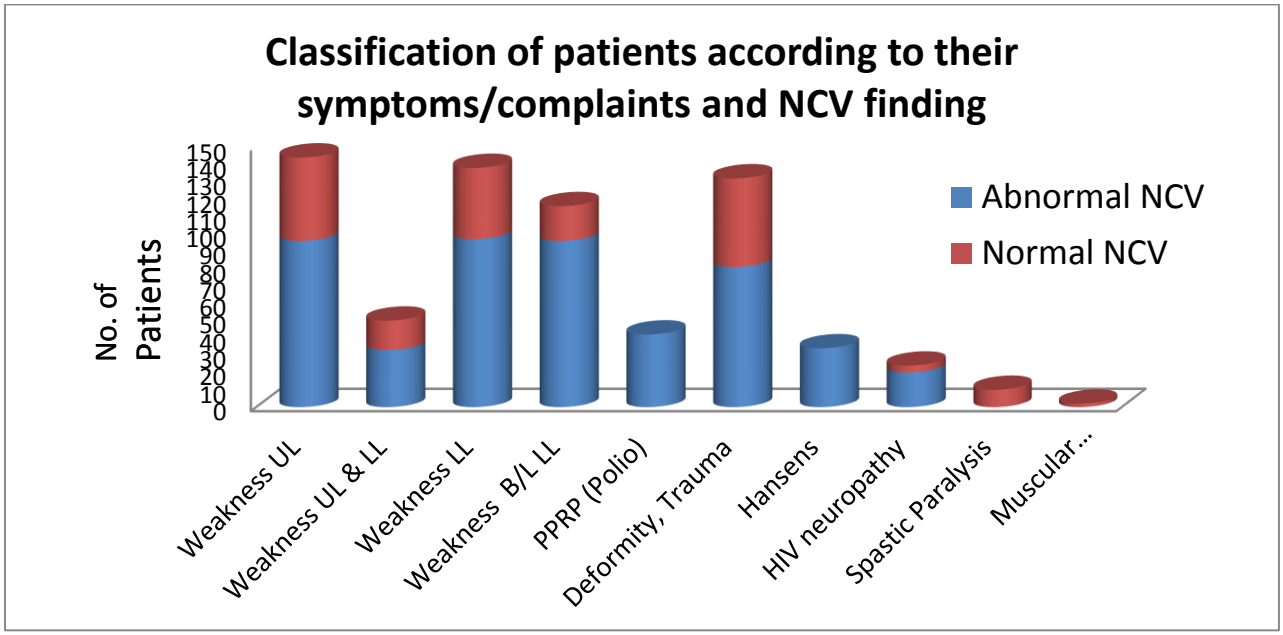
Statistical Analysis:

Statistical analysis was done with **SPSS 16** software. Mean and standard deviation of latency, duration, amplitude and conduction velocity of CMAP/SNAP of nerves were calculated. Significance of the change in these variables was found out using paired and unpaired T test.

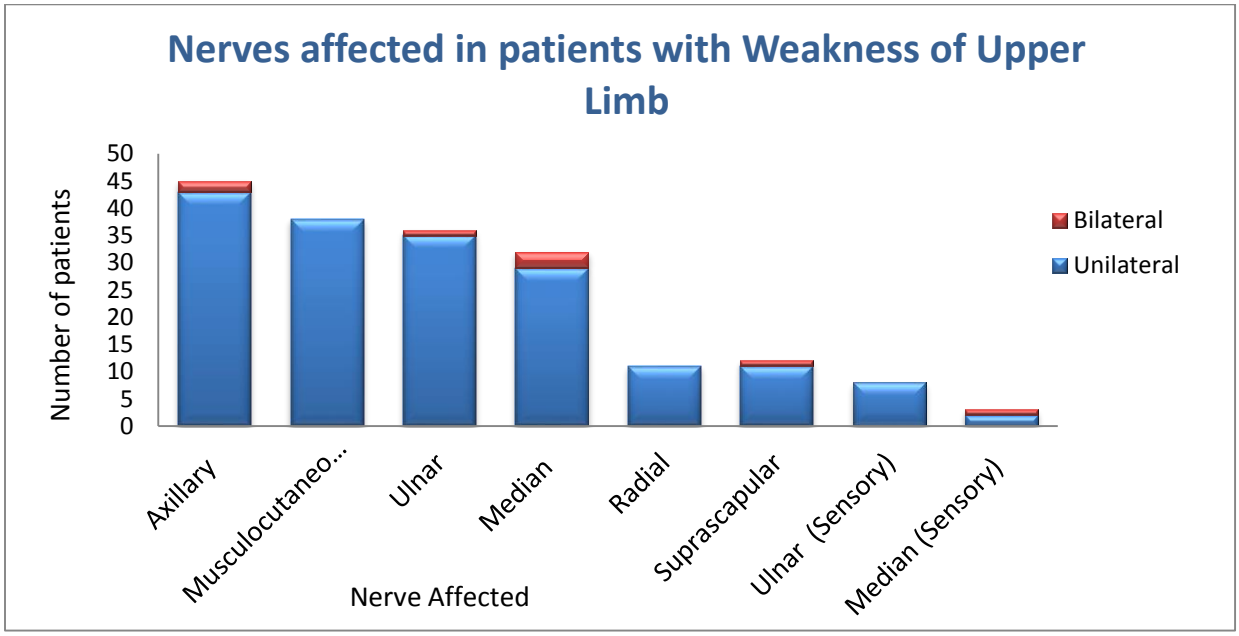
Table 1: Descriptive statistics of patients

	Female (N- 193)				Male (N-499)			
Parameter	**Age**	**Height**	**Weight**	**BMI**	**Age**	**Height**	**Weight**	**BMI**
Mean ± Standard deviation	32.07± 15.94	146.39 ± 15.56	41.82 ±12.37	19.12 ± 4.16	34.39 ± 15.47	160.28 ± 16.12	50.75 ± 14.30	19.33 ± 3.84

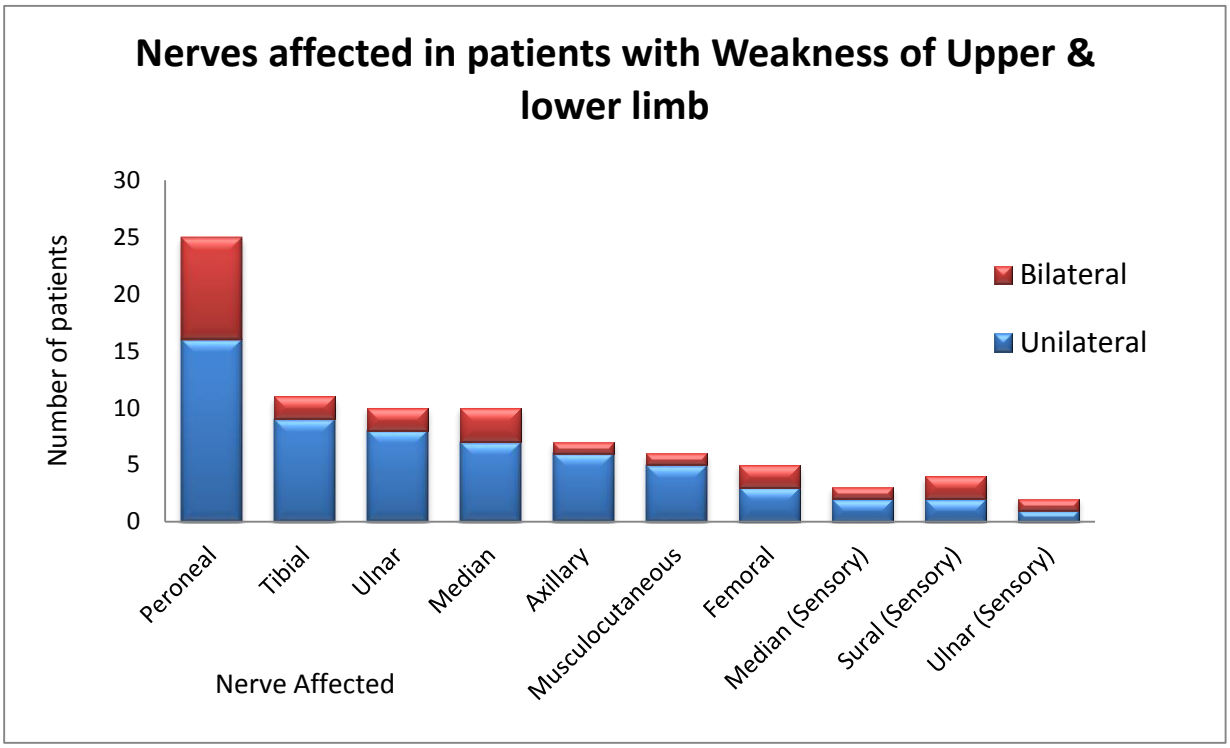
Graph 1: **Classification of patients according to their symptoms/complaints and NCV finding.**



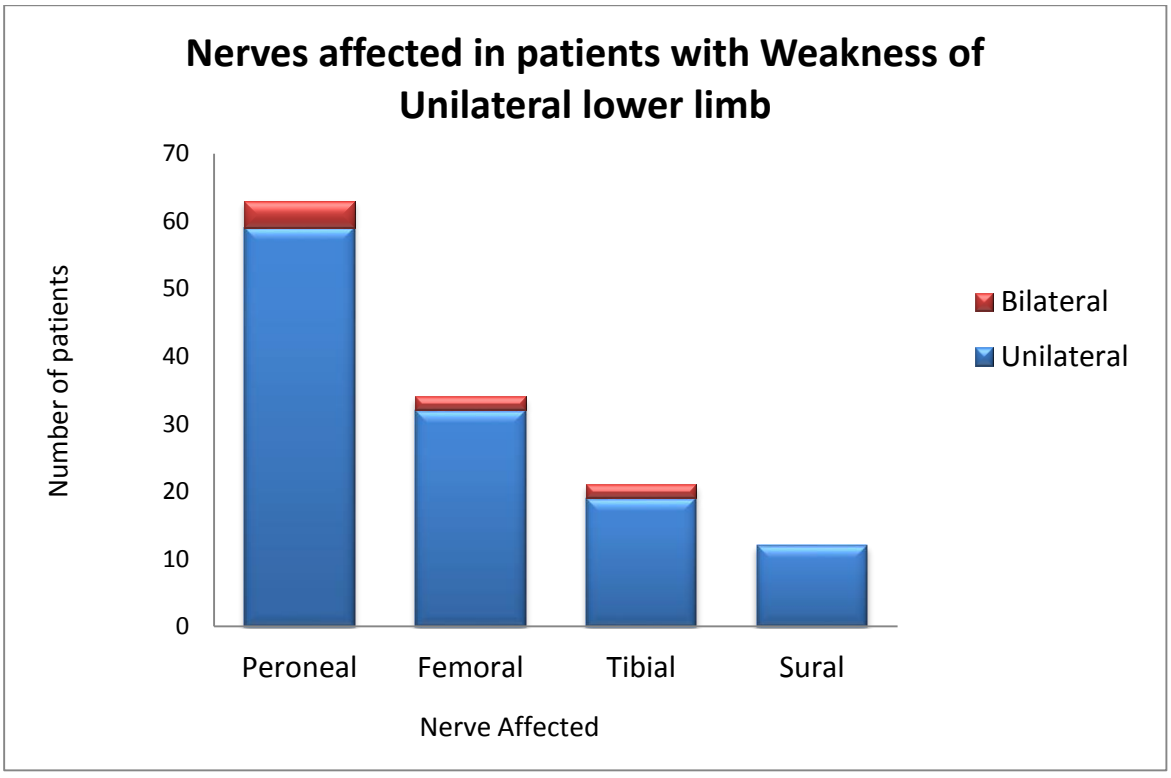
Graph 2: **Pattern of nerve involvement in patients with Weakness of Upper Limb (N-96)**



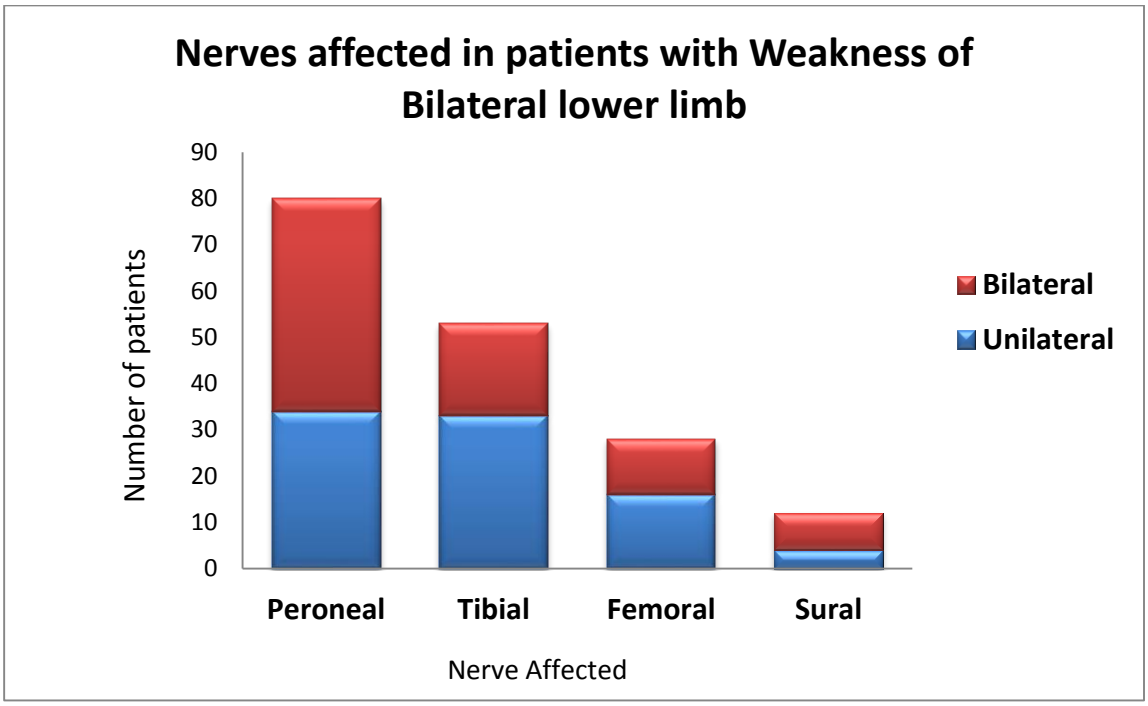
Graph 3: **Pattern of nerve involvement in patients with Weakness of Upper and lower Limb (N-33)**



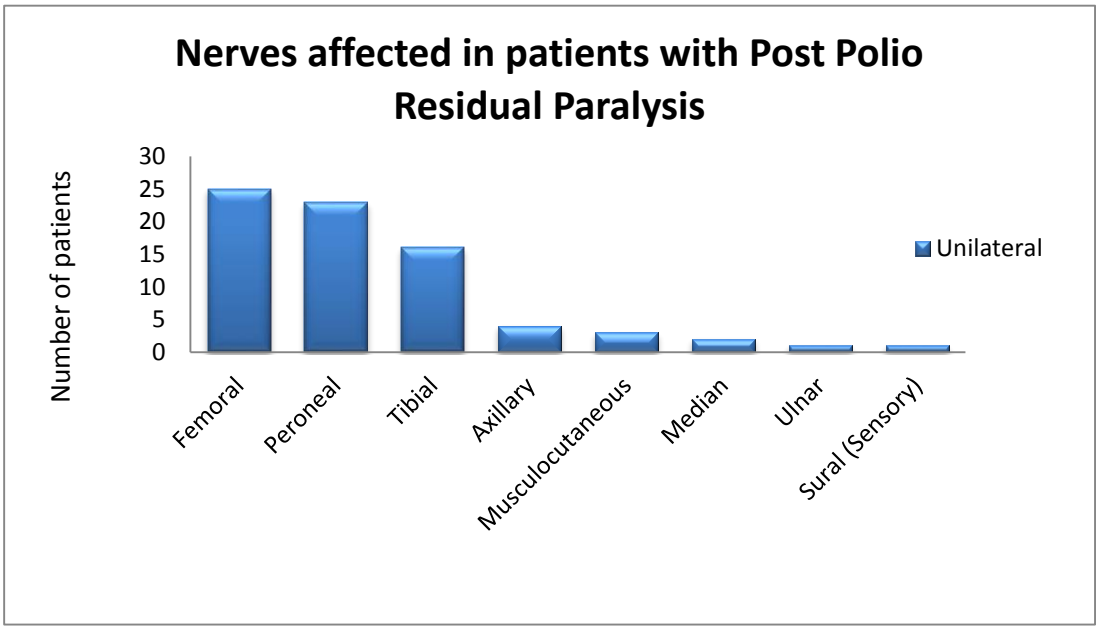
Graph 4: **Pattern of nerve involvement in patients with Weakness of unilateral lower Limb (N-97)**



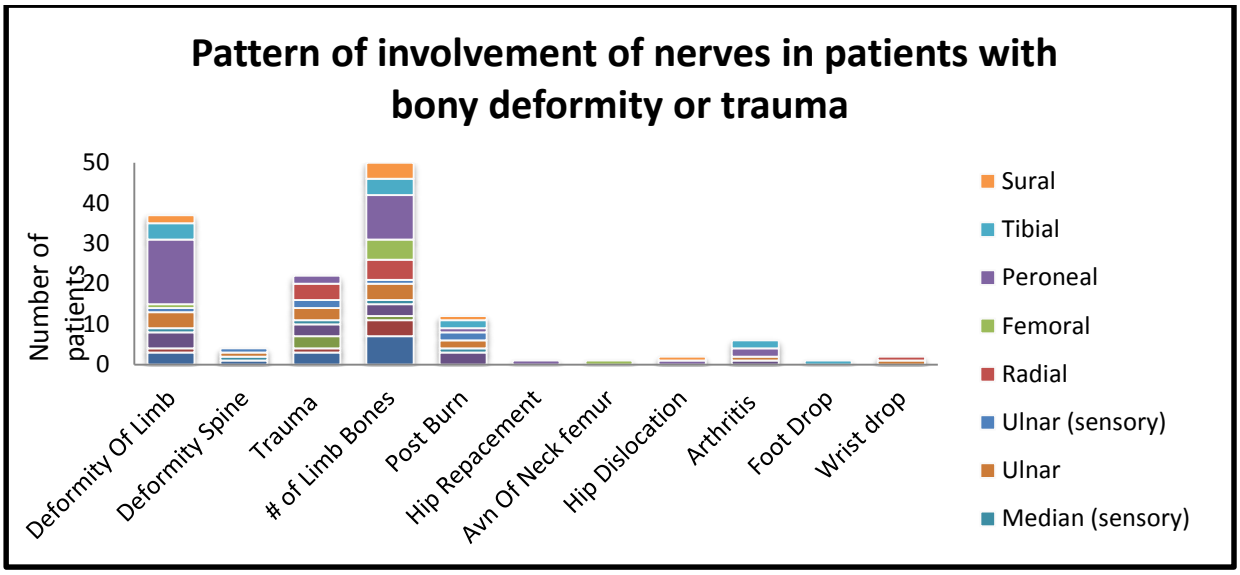
Graph 5: **Pattern of nerve involvement in patients with Weakness of bilateral lower Limb (N-96**



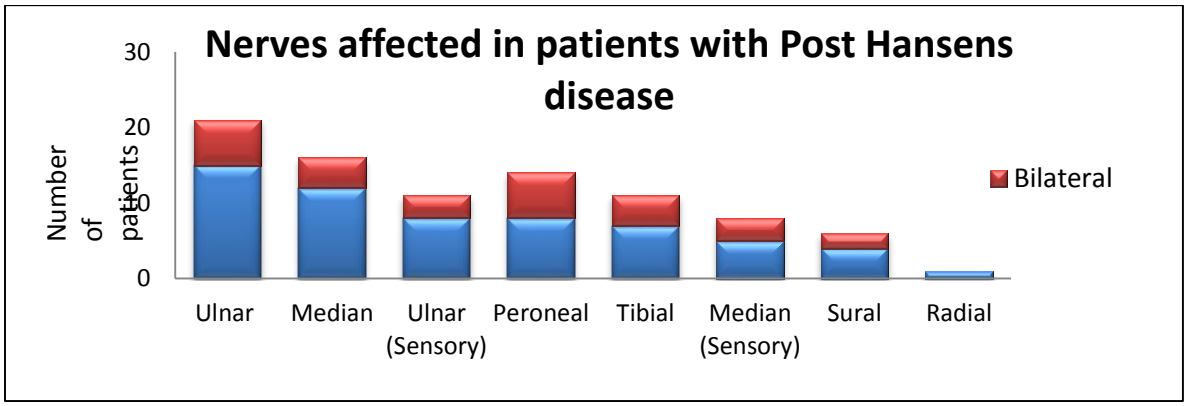
Graph 6: **Pattern of nerve involvement in patients with Post Polio Residual Paralysis (N-42)**



Graph 7: **Pattern of nerve involvement in patients with bony deformity or trauma (N-81)**



Graph 8: **Pattern of nerve involvement in patients with Post Hansen's disease (N-34)**



Graph 9: **Pattern of nerve involvement in patients with retroviral disease (N-20)**

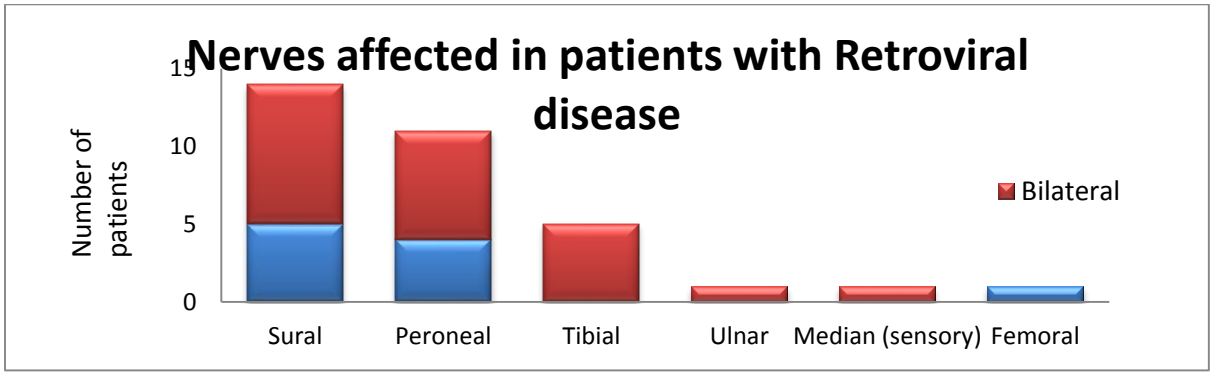


Table 2: **Comparison of the Latency, Duration, Amplitude and conduction velocity of CMAP/SNAP of nerves of disabled limb with that of normal limb in cases of unilateral upper limb weakness with Paired T test (N- 96)**

Nerve		Mean	Std. Deviation	t value	Significance (2 tailed)
Axillary Nerve (N – 43)	Latency1	3.4091	1.15995	-2.65738	0.**022***
	Latency2	4.8451	3.87568		
	Duration1	20.9649	4.89371	0.575	0.569
	Duration2	20.0844	9.46492		
	Amplitude1	25.5512	11.15199	12.489	**0.000****
	Amplitude2	6.2349	6.52759		
Musculocutaneous Nerve (N- 38)	Latency1	4.8737	2.47612	-1.494	0.144
	Latency2	5.6968	3.26777		
	Duration1	24.8608	4.08491	4.708	**0.000****
	Duration2	17.7637	8.91028		
	Amplitude1	25.4971	7.51572	13.374	**0.000****
	Amplitude2	8.1211	5.65796		
Ulnar Nerve (N – 35)	Latency1	2.7420	1.42241	1.518	0.138
	Latency2	2.2823	1.95932		
	Duration1	13.1023	4.73990	4.225	**0.000****
	Duration2	8.3074	5.87220		
	Amplitude1	14.5714	4.01472	16.745	**0.000****
	Amplitude2	3.4686	3.00771		
	NCV1	55.4311	8.62831	3.176	**0.003****
	NCV2	39.2774	32.17237		
Median Nerve (N – 29)	Latency1	3.9314	1.34521	0.385	0.703
	Latency2	3.6752	4.07194		
	Duration1	16.7769	6.71934	2.417	**0.022***
	Duration2	11.4797	8.13204		
	Amplitude1	18.9810	5.63466	13.666	**0.000****
	Amplitude2	4.8931	4.65410		
	NCV1	49.5083	12.93885	3.827	**0.001****
	NCV2	35.6193	21.80016		
Radial Nerve (n – 11)	Latency1	3.6545	2.79883	-0.576	0.578
	Latency2	4.1018	3.01293		
	Duration1	14.0164	2.81317	0.077	0.940
	Duration2	13.7973	8.52503		
	Amplitude1	7.3091	3.80643	3.981	**0.003****
	Amplitude2	2.9818	1.81814		
	NCV1	63.0933	7.76168	2.581	0.123
	NCV2	49.7200	9.10400		
Suprascapular Nerve (N – 11)	Latency1	3.3236	2.12982	0.023	0.982
	Latency2	3.3036	2.93689		
	Duration1	24.5427	6.90839	0.861	0.410
	Duration2	20.7200	12.38974		
	Amplitude1	19.2909	9.32689	7.209	**0.000****
	Amplitude2	5.4865	5.78169		
Ulnar (sensory) Nerve	Latency1	2.4688	0.84783	2.411	**0.047***

(N – 8)	Latency2	1.1300	1.63289		
	Duration1	2.5838	3.24389	1.652	0.142
	Duration2	0.5525	0.78034		
	Amplitude1	49.9250	22.17513	5.620	**0.001****
	Amplitude2	4.5000	7.50676		
	NCV1	46.5650	10.60192	4.989	**0.002****
	NCV2	8.5537	16.27259		
Median (sensory) Nerve (N – 2)	Latency1	1.7750	0.20506	0.370	0.775
	Latency2	1.3350	1.88798		
	Duration1	3.9800	2.68701	2.582	0.235
	Duration2	0.5850	0.82731		
	Amplitude1	88.6500	20.57681	9.982	0.064
	Amplitude2	6.3000	8.90955		
	NCV1	60.9600	27.28018	0.839	0.556
	NCV2	24.3450	34.42903		

Note: Latency1, Duration1, Amplitude1 & NCV 1- values of Normal limb
Latency2, Duration2, Amplitude2 & NCV 2- values of affected limb

Table 3: **Comparison of the Latency, Duration, Amplitude and conduction velocity of CMAP/SNAP of nerves of disabled limb with that of normal limb in cases of upper and lower limb weakness with Paired T test (N- 33)**

Nerve		**Mean**	**Std. Deviation**	**t value**	**Significance (2 tailed)**
Axillary Nerve (N – 6)	Latency1	2.3450	0.92660	-0.484	0.649
	Latency2	2.7600	2.46317		
	Duration1	23.4533	7.06085	1.317	0.245
	Duration2	15.8167	8.78783		
	Amplitude1	19.7833	9.68430	3.876	**0.012***
	Amplitude2	9.0333	8.91688		
Musculocutaneous Nerve (N- 5)	Latency1	2.958	1.18	-0.542	0.616
	Latency2	3.354	1.956		
	Duration1	27.66	7.35	0.829	0.454
	Duration2	23.168	13.08		
	Amplitude1	16.32	5.5836	2.286	0.084
	Amplitude2	5.86	5.55		
Median Nerve (N – 7)	Latency1	3.0643	0.4351	0.945	0.381
	Latency2	2.4700	1.3833		
	Duration1	13.9586	1.15906	0.899	0.403
	Duration2	11.8457	6.46197		
	Amplitude1	19.8429	4.09140	4.607	**0.004****
	Amplitude2	7.7000	6.74018		
	NCV1	53.8943	8.14204	0.662	0.533
	NCV2	46.8843	24.15077		
Median (sensory) Nerve	Latency1	2.25	0.00	0.965	0.511

(N – 2)	Latency2	1.145	1.145		
	Duration1	1.915	0.530	7.105	0.089
	Duration2	0.565	0.799		
	Amplitude1	51.45	30.6177	2.084	0.285
	Amplitude2	2.05	2.899		
	NCV1	48.89	0.00	1.036	0.489
	NCV2	24.01	33.96		
Ulnar Nerve (N – 8)	Latency1	2.0575	0.719	-1.790	0.117
	Latency2	3.00	1.535		
	Duration1	14.44	4.526	1.833	0.109
	Duration2	9.50	5.307		
	Amplitude1	15.025	5.439	5.382	**0.001****
	Amplitude2	4.987	4.023		
	NCV1	51.71	9.377	0.075	0.943
	NCV2	51.18	20.087		
Femoral Nerve (N – 3)	Latency1	4.2700	1.2817	3.214	0.085
	Latency2	3.8200	1.2178		
	Duration1	20.1767	0.7071	-0.969	0.435
	Duration2	25.6600	10.3237		
	Amplitude1	31.6333	13.4433	2.983	0.096
	Amplitude2	11.2167	7.23884		
Peroneal Nerve (N – 16)	Latency1	3.3738	1.309	0.926	0.369
	Latency2	2.9288	2.1319		
	Duration1	11.85	2.61	1.65	0.120
	Duration2	10.27	4.387		
	Amplitude1	10.78	5.77	5.681	**0.000****
	Amplitude2	4.32	3.85		
	NCV1	53.68	9.79	2.475	**0.027***
	NCV2	44.578	13.84		
Tibial Nerve (N – 9)	Latency1	3.21	1.445	-1.121	0.295
	Latency2	4.016	1.36		
	Duration1	9.38	3.70	-1.089	0.308
	Duration2	11.227	3.066		
	Amplitude1	21.72	6.75	3.436	**0.009****
	Amplitude2	12.44	6.43		
	NCV1	44.13	5.199	0.193	0.852
	NCV2	43.68	8.699		
Sural (sensory) Nerve (N – 2)	Latency1	3.687	1.078	0.999	0.391
	Latency2	2.937	1.96		
	Duration1	1.335	0.108	-0.688	0.541
	Duration2	1.93	1.629		
	Amplitude1	11.85	7.78	1.971	0.143
	Amplitude2	3.05	2.76		
	NCV1	39.44	7.569	0.879	0.444
	NCV2	29.39	19.67		

Note: Latency1, Duration1, Amplitude1 & NCV 1- values of Normal limb
Latency2, Duration2, Amplitude2 & NCV 2- values of affected limb

Table 4: **Comparison of the Latency, Duration, Amplitude and conduction velocity of CMAP/SNAP of nerves of disabled limb with that of normal limb in cases of unilateral lower limb weakness with Paired T test (N- 97)**

Nerve		Mean	Std. Deviation	t value	Significance (2 tailed)
Femoral Nerve (N – 32)	Latency1	3.5262	1.98	-0.153	0.879
	Latency2	3.6197	2.511		
	Duration1	23.05	5.06	-1.326	0.194
	Duration2	24.827	6.72		
	Amplitude1	23.646	8.039	10.633	**0.000****
	Amplitude2	8.76	5.348		
Peroneal Nerve (N – 59)	Latency1	3.3036	1.476	1.381	0.172
	Latency2	2.58	3.736		
	Duration1	11.95	4.307	3.182	**0.002****
	Duration2	8.51	7.71		
	Amplitude1	10.98	4.864	12.806	**0.000****
	Amplitude2	2.219	2.29		
	NCV1	50.507	9.22	6.442	**0.000****
	NCV2	28.90	22.705		
Tibial Nerve (N – 19)	Latency1	4.479	1.55	2.155	**0.045***
	Latency2	3.114	3.357		
	Duration1	12.58	9.80	1.594	0.128
	Duration2	7.57	6.58		
	Amplitude1	19.53	9.10	8.944	**0.000****
	Amplitude2	5.61	8.66		
	NCV1	45.74	8.27	3.704	**0.002****
	NCV2	22.80	21.46		
Sural (sensory) Nerve (N –12)	Latency1	3.188	0.59	1.216	0.249
	Latency2	2.327	2.237		
	Duration1	1.55	0.708	2.533	**0.028***
	Duration2	0.75	0.737		
	Amplitude1	19.50	9.448	5.447	**0.000****
	Amplitude2	2.70	3.219		
	NCV1	48.68	10.76	3.584	**0.004****
	NCV2	23.88	21.86		

Note: Latency1, Duration1, Amplitude1 & NCV 1- values of Normal limb
Latency2, Duration2, Amplitude2 & NCV 2- values of affected limb

Table 5: **Comparison of the Latency, Duration, Amplitude and conduction velocity of CMAP/SNAP of nerves of subjects with abnormal NCS with that of normal NCS by Unpaired T Test in cases of bilateral limb weakness (N- 96).**

Nerve		Mean	Std. Deviation	t value	Significance (2 tailed)
Femoral Nerve (N – 12)	Latency1	2.97	1.33	2.946	**0.007****
	Latency2	1.90	1.45		
	Duration1	22.89	5.04	4.441	**0.000****
	Duration2	13.65	9.28		
	Amplitude1	22.88	6.04	13.03	**0.000****
	Amplitude2	3.63	4.38		
Peroneal Nerve (N – 46)	Latency1	3.22	1.133	2.042	0.044*
	Latency2	2.56	2.72		
	Duration1	10.59	2.205	2.318	**0.023***
	Duration2	8.39	8.655		
	Amplitude1	9.11	3.417	17.23	**0.000****
	Amplitude2	1.77	1.725		
	NCV1	52.77	5.92	10.037	**0.000****
	NCV2	26.27	23.97		
Tibial Nerve (N – 20)	Latency1	3.55	1.108	1.392	0.172
	Latency2	2.73	3.429		
	Duration1	9.857	2.434	4.728	0.000**
	Duration2	5.50	5.686		
	Amplitude1	24.90	8.99	13.547	**0.000****
	Amplitude2	2.48	4.078		
	NCV1	45.93	5.74	7.41	**0.000****
	NCV2	18.82	20.61		
Sural (sensory) Nerve (N –8)	Latency1	3.100	0.97	4.426	0.000**
	Latency2	0.805	1.463		
	Duration1	1.699	0.717	4.659	**0.000****
	Duration2	0.353	0.649		
	Amplitude1	18.218	5.96	8.361	**0.000****
	Amplitude2	1.937	3.599		
	NCV1	47.58	12.95	6.929	**0.000****
	NCV2	10.72	19.20		

Note: Latency1, Duration1, Amplitude1 & NCV 1- values of Patients with normal NCS
Latency2, Duration2, Amplitude2 & NCV 2- values of Patients with abnormal NCS

Results:

Our study includes 193 females and 499 males whose mean age, height, weight and body mass index [**are matched using statistical analysis] as** shown in Table 1. As shown in Graph 1, patients were categorized in 10 groups according to their complaints/symptoms/past medical history, as well as again subdivided into 2 groups according to their NCS findings.

Graph 2-9 explain about pattern of nerve involvements in each of these categories except spastic paralysis and muscular dystrophy group in which all patients were found normal in NCS. In spite of patient complaining only unilateral weakness, incidentally we found neuropathic changes in normal limb also. Nerves which has shown high frequency of damage are; Axillary nerve (weakness of upper limb), Peroneal nerve (weakness of lower limb), Femoral nerve (post polio residual paralysis), Ulnar Nerve (post Hansen's) and Sural nerve (retroviral disease). As shown in Graph 7, in trauma/ deformity/ arthritis/ burns only 61% (81/132) of total patients have shown abnormal NCS and nerve

involvement is dependent on site of affection e.g. in cervical spinal cord suppression axillary and median nerves are involved. Arthritis involved distal nerves like Median, Ulnar, Tibial and Peroneal nerves while Fractures and deformities affect local nerves nearby the defect.

In Table 2-4, Comparison of the latency, duration, amplitude and conduction velocity of CMAP/SNAP of nerves of disabled limb with that of normal limb is done with Paired T test for cases of unilateral upper/lower limb weakness. 'p'<0.05 (*) denotes that difference is statistically significant and 'p'<0.01 (**) denotes highly significant difference. For most of nerves highly significant ('p'<0.01) reduction in amplitude of CMAP/SNAP is seen. Few nerves have shown significant ('p'<0.01) reduction in duration of CMAP/SNAP (Musculocutaneous, Ulnar, Median nerve in Table 2 and Peroneal, Sural nerve in Table 4). Significant ('p'<0.01) decrease in conduction velocity of nerve is seen in Ulnar, sensory Ulnar and Median nerve in Table 2, Peroneal nerve in Table 3 as well as Sural, Tibial and Peroneal nerve in Table 4. Prolongation of latency of CMAP/SNAP is seen in most of the nerves but significantly ('p'<0.05) only in Axillary nerve in Table 2. These changes are suggestive of axon loss neuropathy which is an advanced type of neuropathy.

In Table 5, Comparison of the latency, duration, amplitude and conduction velocity of CMAP/SNAP of nerves of subjects with abnormal NCS with that of normal NCS is done by Unpaired T Test in cases of bilateral limb weakness. Significant ('p'<0.01) reduction in amplitude, duration and conduction velocity of CMAP/SNAP of all nerves of lower limb i.e. Femoral, Peroneal, Tibial and Sural nerve is seen. These changes also are suggestive of axon loss neuropathy which is an advanced type of neuropathy. Only the significant ('p'<0.01) reduction in latency of CMAP/SNAP is an unusual incidental finding in this group of patients.

Discussion:

Patients coming to Disability evaluation board with a complaint of weakness of limbs have either unknown pathology or known cause e.g. history of trauma/accidents, Diabetes, Hansen's disease, retroviral disease, Poliomyelitis. Weakness or paralysis may be due to damage to upper motor neurons, lower motor neurons, the neuromuscular junction or the muscle. Weakness or paralysis due to neuropathies is hypotonic in type and associated with muscle wasting (atrophy). [4, 5] Nerve conduction study is a reliable, noninvasive and less expensive tool to assess neuropathies causing disability. In our institute we have started the innovative protocol for every patient coming to Institutional disability evaluation board to get Nerve conduction study done. This way we can confirm neuropathies in patients with known history of neuropathic diseases as well as exclude neuropathies in patients with unknown cause of weakness. Typical nerve conduction study abnormalities seen with axon loss or demyelination type of neuropathies are as follows: [6]

Sr. No.		**Axon Loss**	**Demyelination**
1	**Sensory responses**	Small or absent	Small or absent
2	**Distal motor Latency.**	Normal or slightly prolonged	Prolonged
3	**Compound muscle action potential (CMAP) Amplitude**	small	Normal (reduced if conduction block or temporal dispersion)
4	**Conduction block/ temporal dispersion**	Not present (responses may disperse slightly	Present
5	**Motor conduction velocity**	Normal or slightly reduced	Notably reduced

6	**F waves minimum Latency**	Normal or slightly prolonged	Significantly prolonged

In our study we found mostly axon loss type of neuropathy in most patients with limb weakness with unknown cause. Significant decrease of CMAP/SNAP amplitude was the consistent finding in these patients. In some patients mix findings found were of demyelination type prolonged latency with decreased conduction velocity as well as axon loss type decrease of CMAP/SNAP amplitude. Neuropathies which are found in patients without any past history of known neuropathic diseases may be due to either deficiency of vitamins like thiamin(B1) , niacin(B3), pantothenic acid(5), pyridoxine(B6), B12, folic acid etc. or low hemoglobin count. Addiction of tobacco or alcohol is also additive factor for nutritional deficiency of these vitamins.

Known diseases which can cause neuropathies are leprosy, poliomyelitis and retroviral disease. Leprosy is one of the principal causes of nontraumatic neuropathy and is clinically manifested as lesions of the skin and peripheral nerves. It is well known that the sensory nerves are first to be affected in leprosy. Therefore, in the early stages of nerve damage it is the sensory fibers that show a greater quantum of impaired conduction velocities when compared with those in the motor fibers. Conversely, in advanced stages, the Amplitude changes, they are more marked in the motor nerve fibers. [7] According to one study, motor nerve conduction (MNC) variables of common Peroneal nerve were abnormal in 80% of all patients, MNC of median nerve was abnormal in 72.5%, while MNC of Ulnar nerve was abnormal in 70% and SNC of Ulnar nerve was abnormal in 77.5% of the total patients.[8] In our study motor Ulnar nerve was the commonest nerve involved.

Another common association of weakness is with poliomyelitis. A common person describes an atrophied, shortened limb as the Latency effects of poliomyelitis. Those affected with acute paralytic poliomyelitis can experience Post-Polio syndrome (PPS) an average of 35 years after an infection. In our study also, out of 490 patients with weakness of limbs most patients labeled it as polio at first. But after taking proper history only 42 patients were having confirmatory history of childhood poliomyelitis. Lower limb involvement which is an established fact about polio was true in our study also but about 23% (10/42) patients had upper limb involvement. Risk factors for PPS include: the severity of the acute poliomyelitis paralysis, age at onset of the acute poliomyelitis (higher risk with adolescent and adult onset), the amount of recovery, greater physical activity and duration of the intervening years. [9-12]

In retroviral disease, risk factors for the development of peripheral neuropathy are low CD4+ cell counts, HIV-1 viral load, antiretroviral drugs used like stavudine-didanosine or opportunistic infection with cytomegalovirus.[13. 15, 16] A study done on 40 hospitalized patients who had well-established diagnoses of acquired immunodeficiency syndrome found reduction in amplitude of Sural nerve action potentials.[14] Also in our study, the commonest nerve affected in patients of retroviral disease is Sural nerve.

Conclusion:

Lower motor neuron disease is causative factor for disability or weakness of limb in greater percentage of patients coming to Institutional disability evaluation board and can be evaluated by nerve conduction study (NCS) test.

IMPLICATION / IMPORTANCE FOR SOCIETY:

Implementation of Nerve conduction study for every patient coming for disability certificate will eliminate chances of malingering or fake disability / handicap certificate. This will reduce competition for reserved seats for physically disabled in education and jobs which is there because of fake disability / handicap certificate. As well as it will reduce overload on compensation, stipends, employment, conveyance allowance, travel concessions, tax-deduction benefits awarded to physically disabled by the government of India.

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