

## EMG study in cases of maturity onset diabetes neuropathy

\*Dr Jinal Pandya\*, Dr. Neeraj Mahajan \*\* Dr Urvashi Kapadia\*\*\*

\*Resident, \*\*Associate Professor, \*\*\* Assistant Professor, Department of Physiology, NHLMMC, Ahmedabad

### Abstract

**Aims and objectives:** To determine the association between types of clinical presentation and severity of neuropathy in NIIDM by electromyography

**Methods:** The study was carried out at private EMG center at Ahmedabad in 2012. Total randomly selected 52 cases male (39), female (13) symptomatic cases of NIDDM were included in study. We included known cases of NIDDM aged 32-88 excluding IDDM and asymptomatic NIDDM patient. The standard Needle EMG was used for study.

**Results:** From our study it was found that maximum (40.3%) cases seen with 6-10 years duration, 57.6% cases have BMI<18.5, 61.1% have >5'7" height, 80.7% don't have positive family history. Associated diseases are HT (23%), CAD (17.3%). Presenting symptoms are tingling-numbness (73%), difficulty in walking (55.7%) Presenting signs are reduced or absent DTR (84.6%) and blunting of sensation (75%) All four limb demyelinating neuropathy seen in 76.9% and LL>UL in other 11.5% cases. All four limb axonal degeneration seen in 11.5% cases while exclusively lower limb is involved in 23% cases

**Conclusion:** From our study we concluded that Factors affecting are old age (>55) male gender, underweight (BMI<18.5), height>5'7", duration>5 years. Further studies for associated diseases are recommended. Common symptoms are tingling numbness and signs are blunting of sensations. Common type (>75%) of neuropathy is demyelinating distal symmetrical.

### Introduction:

Electromyography (EMG) is a technique for evaluating and recording the electrical activity produced by skeletal muscles. The presence of abnormal spontaneous activity (positive sharp waves and fibrillation potentials) suggests active denervation. Analysis of motor unit potentials (MUAPs) on needle EMG helps determine the acuity and severity of nerve injury. Long duration, large amplitude and polyphasic motor unit potentials are seen in chronic axonal neuropathies, due to uninjured motor axons innervating denervated muscle fibers<sup>(1)</sup>. EMG is used to diagnose neuropathies, myopathies and diseases of neuromuscular junction. EMG can not only help localize nerve lesions, but can also determine the chronicity of the neuropathic process. Electromyography is one of the important procedures to diagnosis and assessment of one of the commonest complication of diabetes, diabetic neuropathy. The lifetime incidence of neuropathy is approximately 45% for patients with type 2 diabetes

mellitus and 54% to 59% for patients with type 1 diabetes mellitus<sup>(2)</sup> Studies of nerve conduction tests and electromyography performed at the time of diabetes mellitus diagnosis demonstrate that neuropathy is already present in patients when the neuropathy is still subclinical, and these tests show improvement with intensive control of glycemia<sup>(3)</sup>. among the various neuropathies diabetic neuropathy is a treatable condition, and hence if detected early, the proper treatment can be instituted in the early stages can give rise to good outcome.<sup>(4)</sup>

Aims and objectives:

1. To study the clinical presentation of patients of diabetic neuropathy in non insulin dependent diabetes mellitus (NIDDM)
2. To diagnose and assess types of diabetic neuropathy in NIDDM patients by electromyography.

**Material and methods:**

The study was carried out at private EMG center at Ahmedabad in 2012-13. Total randomly selected 52 cases male (39), female (13) symptomatic cases aged 32-38 of NIDDM were included in study. We included known cases of NIDDM aged 32-88 excluding IDDM and asymptomatic NIDDM patient. Symptomatic NIDDM patients were included and insulin dependent diabetes mellitus (IDDM) patients and non-symptomatic patients of NIDDM were excluded. This study was cross sectional. The standard Needle EMG was used for study. The decision of which muscle should be needled is taken on the bases of nerve conduction velocity (NCV) test. The muscle was examine in two phases1) when the muscle is at rest 2) when the muscle is put into voluntary contraction.

**Result:** Table 1.0 distribution of cases according to symptoms

Sr.no	Symptoms	Total cases	% of cases
1	Tingling-numbness	38	73
2	Difficult in walking	29	55.7
3	Difficult in holding objects	17	32.6
4	Ataxia	4	7.6
5	Others	3	5.7

Patients have different symptoms. 73% presented with tingling and numbness. 55.7% have difficulty in walking. 32.6% have difficulty in holding objects. 7.6% have ataxia and 5.7% have other symptoms like chest pain and weakness

Table 2.0 distribution of cases according to signs

Sr.no	Signs	Total cases	% of cases
1	DTR↓ or absent	44	84.6
2	All four limbs	19	36.5
3	Sensory blunting	39	75
4	Muscle power↓	12	23.07
5	Others	4	7.6

On clinical examination 84.6% showed reduced or absent deep tendon reflexes, 75% of cases sensory examination showed blunting of sensation. There was reduction in power in 23.67%. DTR.

Table 3.0 distribution of cases according to EMG study

Sr.no	Limb involved	Demyelinating		Axonal		Others	
		Cases	%	Cases	%	Cases	%
1	UL & LL	40	76.9	6	11.5	6	11.5
2	UL	2	3.8	3	5.7		
3	LL	1	1.9	12	23		
4	UL>LL	2	3.8				
5	LL>UL	6	11.5				

EMG examination showed that 76.9% of cases have all four limb demyelinating type of neuropathy. Axonal degeneration in both upper limb and both lower limb was in 11.5%. 3.8% have pure upper limb while 1.9% have pure lower limb involvement.

From our study it was found that 36.50% cases were >60 years, 28.80% cases were between 51-60, 19.20% cases were between 41-50 and 15.30% cases between 30-40. 75% were male and 25% were female. According to BMI of patients 57.6% cases have BMI <18.5, 26.8% cases have BMI between 18.5-22.9 and 15.3% cases have BMI >22.9. 61.4% cases have height more than 5'7" and rest 38.6% were of 5'6" or less height. From this study it was quite clear that neuropathy is seen in those patients of diabetes who were quite tall. 80.7% cases do not have family history of diabetes. 40.3% cases have 5-10 years duration of diabetes while 28.8% cases have <5, 13.4% cases have 11-15 and rest 11.5% cases have >16 years of duration of diabetes. Diseases associated with diabetes are hypertension 23%, CAD 17.3%, obesity 15.3% and others 11.5%. Smoking associated in 21.1% cases.

### Discussion and Conclusion:

Majority of the cases lies in the later age group so it's common over 50 years of age. Studies from Sri Lanka show a high prevalence of neuropathy at the time of diagnosis and a significantly higher prevalence with advancing age which is similar to our study. <sup>(5)</sup> Males are more affected than female but there is no definite documentation to show that males are more affected it may be just incidental so further study is recommended. It is known fact that diabetes per se is seen in obese persons but neuropathy patients are lean and thin persons. <sup>(6)</sup> One of the known factors to predispose to neuropathy is nutritional deficiency. From our study it is quite evident that duration of DM is more than 5 years in more than 65% of cases. Studies from Sri Lanka show a high prevalence of neuropathy at the time of diagnosis (9.8%) and a significantly higher prevalence with duration of disease. <sup>(5)</sup> The pattern of inheritance and the environmental factors differ in IDDM and NIDDM. HT and CAD are the most

common associated diseases and smoking predisposes to neuropathy. It is a known fact that smoking and alcohol consumption predispose to neuropathy. <sup>(6)</sup> Commonest symptoms are tingling and numbness in feet and lower limbs. Common signs associated with diabetic neuropathy are sensory blunting and decrease DTR. <sup>(7)</sup> Both axonal degeneration and segmental demyelination can occur in diabetic neuropathy. Current information supports the hypothesis that diabetes can primary affect both the axon and Schwann cell in the development of polyneuropathy. The disease can produce a distal, length dependent axonopathy and also segmental demyelination. Primary nerve dysfunction in diabetic polyneuropathy is produced by demyelination. Axonal dysfunction parallels the severity of demyelinating process. <sup>(8)</sup>

### Conclusion:

EMG examination reveals that majority of diabetic neuropathy patients (more than 75% of cases) have a demyelinating type of neuropathy, while remaining show axonal type of degeneration. This is one of the few neuropathies which if treated early, as reversible.

### **References**

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