

Correlation of Clinical Features and Nerve Conduction Study in Patients of Diabetic Neuropathy

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Abstract

Background: Nerve conduction studies (NCS) can document the characteristics of the neuropathy (e.g., axonal, demyelinating) and the localization (eg, mononeuropathy versus radiculopathy or distal neuropathy) and, possibly, the severity and even prognosis for morbidity.

Aims: The present study was conducted to study the type of neuropathy and correlation between the symptoms of diabetic neuropathy with nerve conduction studies.

Material and Methods: It was a hospital based cross-sectional study conducted over a period of one year from January 2017 to December 2018 in department of medicine in collaboration with department of neurology of a tertiary care hospital in Gujrat, India. 50 Diabetic patients age more than 30 years with symptoms of neuropathy were included in the study.

Results: Distal symmetrical sensorimotor polyradiculoneuropathy was the most common neuropathy seen. Autonomic neuropathy, radiculoplexus neuropathy and mononeuropathy were relatively less common.

Conclusion: Earlier diagnosis and treatment of diabetes mellitus could have prevented this complication of diabetes mellitus. Hence regular screening for diabetes mellitus should be carried out in the general population especially in people above the age of forty having family history of diabetes mellitus.

Keywords: Nerve Conduction Study, Diabetic Neuropathy, Symptoms, Screening.

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Introduction

Diabetes mellitus [DM] refers to a group of common metabolic disorders that share the phenotype of hyperglycaemia. Diabetes mellitus is characterized by chronic hyperglycaemia with disturbance of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, insulin action or both. Type 1 diabetes is result of complete or near total insulin deficiency. Type 2 DM is a heterogeneous group of disorders characterized by variable degrees of insulin resistance, impaired insulin secretion and increased glucose production.[1,2]

Chronic complications can be divided into vascular and nonvascular complications. The vascular complication of DM are further subdivided into microvascular (retinopathy, neuropathy and nephropathy) and macro vascular complications (coronary artery disease, peripheral arterial disease, cerebrovascular

disease). Nonvascular complications include problems such as gastroparesis, infections, cataract, glaucoma and skin changes. Hearing loss is also occurs in long standing cases. [2,3]

A widely accepted definition of diabetic peripheral neuropathy is “the presence of symptoms and/or signs of peripheral nerve dysfunction in people with diabetes after exclusion of other causes. Patient with type 2 diabetes mellitus may present with distal polyneuropathy after only a few years of known poor glycemic control: sometimes, these patients already have neuropathy at the time of diagnosis. [2,4] Nerve conduction studies (NCS) and electromyography (EMG) can document the characteristics of the neuropathy (e.g., axonal, demyelinating) and the localization (eg, mononeuropathy versus radiculopathy or distal neuropathy) and, possibly, the severity and even prognosis for morbidity. Multiple consensus panels

recommend the inclusion of electrophysiologic testing in the evaluation of diabetic neuropathy. These same panels recommend the use of nerve conduction velocity (NCV)/EMG procedures in clinical research studies. [2,4]

The present study was carried out to study the type of neuropathy and correlation between the symptoms of diabetic neuropathy with nerve conduction studies.

Materials and Methods

Study Design, Settings and Participants

It was a hospital based cross-sectional study conducted over a period of one year from January 2017 to December 2018 in department of medicine in collaboration with department of neurology of a tertiary care hospital in Gujrat, India. 50 Diabetic patients age more than 30 years with symptoms of neuropathy were included in the study. Patients with neuropathy due to any other cause like chronic alcoholic, nutritional, metabolic, toxic, infectious, traumatic, compressive were excluded from the study.

Data Collection

After receiving informed written consent, interviews with the study subjects' carers who were present in the OPD or IPD were conducted. The patients who were included underwent a thorough physical examination as well as a thorough neurological assessment that included sensory and motor testing as well as other pertinent testing. Relevant studies using the RMS-EMG.EP MARK-2 (Version 1.1) [5] and Nicolet-Viking Quest (Version 10) NCV machines, as well as RBS, FBS, PP2BS, and HbA1c, were completed. According to the proforma, the data was captured. The existence

of the deep tendon reflex (DTR), its diminution, and the absence of DTR signals were used to assess the disability caused by peripheral neuropathy. Tuning forks (128 Hz) placed on each medial malleolus were used to measure the threshold for vibration perception. Pinprick tests for pain, wisp cotton tests for touch, hot and cold water tests for temperature, position sense tests, and DTR tests were also conducted.

Statistical Analysis

Data were analyzed and statistically evaluated using SPSS software, version 25 (Chicago II, USA). Quantitative data was expressed in mean, standard deviation while qualitative data were expressed in percentage. 'P' value less than 0.05 was considered statistically significant.

Ethical Issues

All caregivers were explained about the purpose of the study. Confidentiality was assured to them along with informed written consent. The study was approved by the Institutional Ethical Committee.

Observation & Results

Out of 50 patient 25 are male and 25 are female. In age wise distribution highest no. of patients were in age group of 51-60 years group which include 18 patients and 36% of total, in 31-40 year 6%, in 41-50 year 6%, in 61-70 year 32%, in 71-80 year 14% and in 81-90 years age group 6% patients. Table 1 shows various symptom & signs in diabetic neuropathy subjects. Among different risk factors, CVD was present in 50%, hypertension in 46%, smoking in 34% and hypertriglyceridemia present in 6% of patients.

Table 1: Symptoms & signs in diabetic study population (n=50)

	Number of patients (%)
Symptoms	
Tingling	47 (94%)
Burning feet	43 (86%)
Hyperesthesia	34 (68%)
Weakness	5 (10%)
Abnormal gait	3 (6%)
Blurred vision	2 (4%)
Weight loss	12 (24%)
Foot ulcer	1 (2%)
Sign	
Loss of vibration sense	29 (58%)
Loss of joint position sense	21 (42%)
Diminished of light touch	25(50%)
Loss of ankle jerk	30 (60%)

Table 2 show that distal symmetrical sensory motor polyradiculopathy (88%) was the most common type of neuropathy seen in diabetic patients. Autonomic neuropathy was present in 8% patient, radiculoplexus

neuropathy present in 6% patient and Mononeuropathy was present in 12 % patients. Lower limb was involved in all cases.

Table 2: Extremities involved, type of neuropathy & nerve involved in study population (n=50)

	Number Of Patients (%)
Extremities	
Lower limb	50 (100%)
Upper limb	25 (50%)
Type of neuropathy	
Distal symmetrical sensory and sensory-motor polyradiculopathy	44 (88%)
Autonomic neuropathy	4(8%)
Radiculopexus neuropathy	3 (6%)
Mononeuropathy	6 (12%)
Nerve involved	
Peroneal	38 (76%)
Tibial	46 (92%)
Sural	42 (84%)
Medial	25 (50%)
Ulnar	25 (50%)

Discussion

In our study male and female patients were equal in number (1:1). In study of Abhijeet et al [6] male were 60% and female were 40%.The higher prevalence in males was probably because of higher incidence of smoking in males.In our study, maximum (36%) patients were found in age group of 51-60 years followed by 61-70 years (32%) and only 6% in 31-40 year group. In the study of Abhijeet et al [6] 46% patients were in age group 51-60 year, and 40% in age group of 41-50 year and only 7% in age group of 31-40 year. Diabetic neuropathy incidence increases with increasing age. Younger people with diabetes have less chances of development of diabetic neuropathy. Among various symptoms of diabetic neuropathy, tingling and burning feet were the most common. In our study tingling was present in 94% patients and burning feet in 86% patients. Finding were in concordance with Kakrani et al⁷ study in which tingling and burning feet was present in 92% and 64% patients respectively. In Abhijeet et al⁶ study, tingling was present in 100% cases of diabetic neuropathy. Various other symptom like hyperesthesia, weight loss, abnormal gait, foot ulcer are less frequent.

Diabetic neuropathy patients present with various signs like diminished ankle jerk, diminished or loss of vibration sense, diminished light touch, loss of joint position sense etc.[9] In our study diminished ankle jerk was present in 60% of cases, loss of vibration sense in 58% of cases and diminished light touch in 50% cases. In Kakrani et al [7] study, diminished ankle jerk was present in 58% of cases, diminished or loss of vibration sense in 58% of cases and diminished light touch in 42% cases. In Abhijeet et al study diminished ankle jerk was present in 80% of cases, diminished or loss vibration sense in 86% of cases and diminished

light touch in 60% cases. These all study shows similar findings.

Diabetic neuropathy has propensity to affect various nerves in body. In our study, lower limb was involved in all patients and upper limb was involved in 50% patients. In our study tibial nerve was involved in 92% patients, sural nerve in 84% patients, median nerve in 50% patients and ulnar nerve was involved in 50% patients. Diabetic neuropathy patients have commonly, simultaneous involvement of multiple nerves but isolated nerve involvement also occurs¹⁰. In our study isolated sural nerve was involved in 8% cases and isolated tibial nerve was involved in 4% cases. Finding were similar to study by Kakrani et al [7] study in which tibial nerve was involved in 86% patients, sural nerve in 82% patients, median nerve in 48% patients and ulnar nerve in 46% patients. Isolated sural nerve, isolated tibial nerve and isolated median nerve was involved in 8%, 4% and 2% cases respectively. Diabetic neuropathy is of various types. Distal symmetrical sensory motor neuropathy is the most common type. In our study 88% patients have distal symmetrical sensory motor neuropathy,8% patients have autonomic neuropathy,6% patients have radiculoplexus neuropathy,12% patients have mononeuropathy.

Another study by Kasthuri AS et al [8] reported that In the clinical neuropathy group 64% patients had distal symmetrical neuropathies (59) with sensory involvement, 4 with motor and one had neuropathic ulcer.

Conclusion & Recommendation

There are many patients in our society who are suffering from diabetes mellitus but are undiagnosed. Many of them are diagnosed to have diabetes when they present with diabetic neuropathy. Earlier diagnosis and treatment of

diabetes mellitus could have prevented this complication of diabetes mellitus. Hence regular screening for diabetes mellitus should be carried out in the general population especially in people above the age of forty having family history of diabetes mellitus.

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