

STUDY OF DIABETES PATIENTS WITH PERIPHERAL NEUROPATHY IN BRIMS TEACHING HOSPITAL, BIDAR

Vijay Kumar B. A¹, Prashant Patil², Satish Mudbi³, Shahank Kulkarni⁴, Shivraj B. Patil⁵, Thirumala Uppar⁶

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ABSTRACT: OBJECTIVE: Peripheral neuropathy is a common complication of diabetes. The Prevalence of peripheral neuropathy among diabetic patients on the basis of loss of vibration sensation had been studied. **METHODOLOGY:** Detailed clinical history of each patient including age, gender, duration of diabetes, foot ulcer and biothesiometry was recorded in 91 diabetic patients between 20 to 80 age. It was observed that all patients under years of age (n=8) felt vibration below 15 volts (no risk zone); 77% (24 out of 31) of the patients in the age group 30-39 years were in the no risk zone, and 23% (n=7) had mild peripheral neuropathy. Sixty per cent of the patients between 40 and 50 years (n=44) were in the no risk zone, while 32% (n=24) had mild peripheral neuropathy, 5% (n=4) had moderate neuropathy and 3% (n=2) have severe neuropathy. **RESULTS:** Amongst patients above 50 years of age, 31% (n=31) were no risk zoen, 34% (n=34) had mild peripheral neuropathy, 22% (n=20) had moderate peripheral neuropathy and 13% (n=13) had severe peripheral neuropathy. Of the patients with diabetes for less than 5 years, 58% had no neuropathy and only 3% had severe neuropathy. Of the patients with diabetes for 5 to 15 years, 50% had no neuropathy, 30% had mild and 10% had severe peripheral neuropathy. When patients with diabetes for over 15 years were studied only 6% had no neuropathy and 19% had severe peripheral neuropathy. **CONCLUSION:** The study reestablishes that the severity of peripheral neuropathy increases with age and vibration perception decreases progressively with increased duration of diabetes. Vibration perception threshold testing helps to identify the high risk the high subjects who require special counseling and education to protect their feet.

KEYWORDS: Diabetes Mellitus Peripheral Neuropathy Small vessel disease.

INTRODUCTION: Peripheral neuropathy is a common complication of diabetes that can affect virtually every tissue of the body and cause significant morbidity and mortality. Best information on the prevalence of diabetic neuropathy is from the population based Rochester Diabetic Neuropathy Study.¹ Between 60 and 65% of either type 1 or type 2 diabetic patients had some neuropathy and 40-45% had distal symmetric polyneruopathy.

However, the prevalence varies due to differences in study population, the definition of diabetic neuropathy and the method of assessment. The prevalence of peripheral neuropathy among diabetic patients attending the outpatient department was studied on the basis of loss of vibration sensation. Since early detection of peripheral neuropathy and foot at risk can prevent many neuropathy related complications of diabetes, the present study was undertaken to assess the extent of diabetic neuropathy, especially in asymptomatic patients attending the outpatient department of the endocrinology unit at Ramakrishana Mission Seva Pratisthan for management of diabetes.

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MATERIAL AND METHODS: The present study was conducted from January-2012 to June-2012. Detailed clinical history of each patient including age, gender, and duration of diabetes, foot ulcer and biothesiometry was recorded for 100 individual between 20 to 80 years of age.

Inclusion Criteria: (1) Patients attending diabetes OPD. (2) Between 20 and 80 years of age. (3) Subject willing to comply with vibration perception threshold (VPT) testing.

Exclusion Criteria: (1) Pregnancy and lactation. (2) Patient having active foot ulcer. (3) Patient having history of foot ulcer. (4) Request of the patient / Subject (5) Unable to participate in a sensory testing.

Biothesiometry: All patients except those having active and previous history of foot ulcer were subjected to biothesiometry. The test is safe and non-invasive. Normally the VPT is below 15 volts, beyond which the diabetic foot is 3 to 7 –fold more prone to ulceration than a non-neuropathy / normal diabetic foot. When the perception threshold exceeds 42 volts, the incidence of diabetic foot can be as high as 23-fold. ²

Sensitometer: VPT (Dhansai laboratory, India) was used for the measurement of VPT. The meter, shows the vibration amplitude in microns and the voltage necessary to generate the vibration has dual scale. The switch of the instrument decides the amount of voltage that is applied to the vibration button. This voltage can be increased from 0 to 5 volts and there is a ‘silent’ mode to check on the subject’s consistency of response.

Procedure: After explanation of the procedure, the instrument was applied on the fingertips to demonstrate vibration. The vibrator button I was then applied to the heads of the 1st, 3rd and 5th metatarsals, the mid foot (plantar aspect) and heel. The voltage was gradually increased by turning the control switch clockwise. Readings were recorded from 6 volts onwards. The patients were asked to respond by saying ‘yes’ or ‘no’ loudly as soon as they felt the vibration. The test was carried out twice and the mean vibration threshold (in volts) was recorded for each area of the foot.

Clinical history and biothesiometry were recoded, tabulated and evaluated to identify the high risk group of the patients and necessary management advised.

OBSERVATIONS: A total 100 individuals were identified of whom male was 60 and female 40. Out of 100 individuals 91 (male 54, female 37) were subjected to VPT test. The remaining 9 patients had either history of foot ulcer who were excluded from the study (Table1).

It was observed that most cases belonged to higher age groups, i.e., 40 to 50 and >50 years (Table 2).

Characteristics	No of cases	
	Male (n=60)	Female (n=40)
VPT done (n=91)	56	39
VPT not done		
History of foot ulcer (n=8)	5	3
Active foot ulcer (n=1)	1	0

Table 1: Sex wise Distribution of Cases in Whom VPT done/ Not Done (n100)

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Age in years	No of case	
	Male	Female
<30	12	7
30-39	13	12
40-50	18	12
>50>	17	9

Table 2: Age and Sex wise Distribution of the Cases (n=91)

VPT	No. of cases
0-15	46
16-25	27
26-42	27
>42	9

Table 3: Showing Vibration Thresholds

Age in years	Results of VTP in volts			
	0-15 (n=46)	16-25 (n=27)	26-42 (n=27)	>42 (n=9)
<30 (n=8)	8 (100%)	0	0	0
30-39 (n=31)	24 (77%)	7 (23%)	0	0
40-50 (n=74)	44 (66%)	24 (32%)	4 (5%)	2 (3%)
>50%	31 (31%)	34(34%)	20 (22%)	13 (13%)

Table 4: Age wise distribution of Cases with results of VTP

VPT in Volts	Duration of diabetes in years		
	<5(n=56)	5-15(n=39)	>15 (n=5)
0-15	62(58%)	44 (50%)	1 (6%)
16-25	34(32%)	26 (30%)	5 (31%)
26-42	8 (%)	9 (10%)	7 (44%)
>42	3(%)	9(10%)	3 (19%)

Table 5: Distribution of cases of Results of VPT in Relation to Duration of Diabetes

The duration of diabetics in the subjects is shown in 49 patients were diabetic for over 5 years, 30 patients had a history of diabetes between 5 and 15 years and 19 patients.

It is recognized that readings from 0-15 volts, indicate 'no risk' (i.e., no peripheral neuropathy). Readings ranging from 16-25 volts, indicate the onset of peripheral neuropathy and readings ranging from 26-42 volts, indicate 'foot at risk' i.e., moderate peripheral neuropathy. Readings over 42 volts indicate severe peripheral neuropathy and suggest that the foot is at high risk for ulceration.^{2,3} It was observed that maximum number of cases (n=46) were in the 0-15 volts VPT (Table 3).

All patients under 30 years age (n=8) were in the no risk zone ie, they felt vibration below 15 volts. Seventy seven percent (n=24) of the patients in the age group of 30-39 years were in the no risk

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zone, and 23% (n=7) had mild peripheral neuropathy. Sixty per cent of the patients between 40 and 50 years (n=44) were in the no risk zone, while 32% (n=24) had mild peripheral neuropathy, 5% (n=4) had moderate neuropathy and 3% (n=2) had severe peripheral neuropathy. Amongst patients above 50 years of age, 31% (n=34) had mild peripheral neuropathy, 22% (n=20) had moderate peripheral neuropathy and 13% (n=13) had severe peripheral neuropathy (Table 4).

Of the patients with diabetes for less than 5 years, 58% had no neuropathy, 32% had mild peripheral neuropathy, 7% had moderate peripheral neuropathy and 3% had severe neuropathy.

Of the patients with diabetes for 5 to 15 years, 50% had no neuropathy, 30% had mild, 10% had moderate and another 10% severe peripheral neuropathy. When patients with diabetes for over 15 years were studied. Only 6% had no neuropathy, 31% had mild, 44% had moderate and 19% had severe peripheral neuropathy (Table 5).

DISCUSSION: Distal symmetrical sensor motor polyneuropathy is the most common form of neuropathy; in its early stages, only sensory loss may be detected. Chronic sensory neuropathy is estimated to occur in 20% of insulin treated diabetic patients.⁴ Mhando and Yudkin⁵ review all 139 admissions at NH, Dar es Salaam, and found peripheral neuropathy in 32.4% of the patients. Zambia 1988, Rolfe⁶ reviewed patients treated in General Medical Clinics and found a prevalence of peripheral neuropathy of 31%.

Significant correlations were observed between the presence of peripheral diabetic neuropathy with age (p<0.05), duration of diabetes (p<0.001), quality of metabolic control (p<0.001), height (p<0.01), the presence of background or proliferate diabetic retinopathy (p<0.01), cigarette smoking (p<0.001), high-density lipoprotein cholesterol (p<0.001) and the presence of cardiovascular disease (p<0.05).⁷

The ability to quantify VPT is a major advantage for documentation or comparison of the progression of neuropathy, since, vibratory sensation is lost first in diabetic patients. Young et al² reported a VTP greater than to 25 volts carried 7-fold risk of foot ulceration compared to VPT less than 15 volts.

Abbott et al³ demonstrated in a multi-centric study of the incidence and predictive risk factors for diabetic neuropathic foot ulcerations that VTP and Michigan DPN scores for muscles strengths and reflexes were significant predictors for foot ulcerations³. The biothesiometer was 90% sensitive and 85% specific at a cut-off of 25 volts.⁸

In this study out 91 diabetic subjects, 34% of the males were over 50 years of age, while 12% of the females were above 50 years. Assuming there is no difference between the sexes with respect to the prevalence of the diabetic peripheral neuropathy, this probably indicates that the older female patients have less opportunity to access our services. The study out of 91 individuals, 46 patients have less than 5 year history of diabetes, 37 individuals had 5-15 years of diabetes and only 7 patients had more than 15 years of diabetes life. This unexpected finding was probably due to increased morbidity of diabetes with advancing age and perhaps due to societal factors.

VTP testing in the present study re-establishes Tesfaye et al⁷ observation that the severity of peripheral neuropathy increases with the age. Duration of diabetes has a great impact on the result of VTP finding. Vibration perception decreased progressively with increased duration of diabetes, a finding confirmed by this study.

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Diabetic peripheral neuropathy is a stealthy complication of diabetes, develop slowly over the years and quietly robbing diabetic patients of their ability to sense trauma and infection. VTP testing helps to identify these high risk groups of diabetic subjects who require special counseling and education to protect their feet. VPT is an easy and non-invasive procedure that yields vital information. Hence, biothesiometry should be included as a routine method for evaluation of every diabetic subject.

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AUTHORS:

1. Vijay Kumar B. A.
2. Kashinath B. Kamble
3. Satish Mudbi
4. Shivraj B. Patil
5. Thirumala Uppar

PARTICULARS OF CONTRIBUTORS:

1. Associate Professor, Department of General Medicine, BRIMS, Bidar.
2. Assistant Professor, Department of General Medicine, BRIMS, Bidar.
3. Senior Resident, Department of General Medicine, BRIMS, Bidar.
4. Junior Resident, Department of General Medicine, BRIMS, Bidar.
5. Junior Resident, Department of General Medicine, BRIMS, Bidar.

6. Medical Record Technician, BRIMS, Bidar.

NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Vijay Kumar B. A,
Associate Professor,
Department of Medicine,
Bidar Institute of Medical Sciences, Bidar.
Email: vijayvb8@gmail.com

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