Diabetic Peripheral Neuropathy And Its Metabolic Determinants In A North Indian Population

Onkar Nath Rai*, Vipin Mishra, Rakesh Chandra**, SK Saxena**, BD Mangal*****

*Assistant Professor, Department of Medicine, GMC Azamgarh, ** Professor, ***Professor & Head, Department of Medicine, KPS PG Institute of Medicine, GSVM Medical College Kanpur, Maharashtra, India

Abstract: Background: The estimates of Diabetic Peripheral Neuropathy prevalence vary widely from 9.6 to 78% in different populations. this study was undertaken to study the prevalence of peripheral neuropathy in diabetes mellitus type-2 pateints and to find the association between biochemical parameters like blood sugar (Fasting, PP), HbA_1c, lipid profile, 24-hours urinary albumen excretion with diabetic peripheral neuropathy. Methodology: This observational study was conducted among randomly selected outdoor and indoor Diabetes Mellitus type-2 patients of GSVM Medical College Kanpur. Diagnosis of diabetes peripheral neuropathy was made on the basis of history, clinical examination and vibration perception. Multivariate regression analysis was used to find the predictors of Diabetic peripheral neuropathy. Results: Majority of patients were aged 60 years and above (57.84%). Prevalence of diabetic neuropathy was 60.7%. Significant association between high blood sugar and peripheral neuropathy was found (<0.05). Conclusion: Screening of Diabetes mellitus and Diabetic peripheral neuropathy can be useful in its early detection and prompt treatment. [Rai O NJIRM 2016; 7(2):1-4]

Key Words: Peripheral neuropathy, Type-2 Diabetes mellitus.

Author for correspondence: Dr. Onkar Nath Rai, Department of Medicine, GMC Azamgarh, UP - 276001, India. Email: semahmood@gmail.com

Introduction: Diabetic peripheral neuropathy (DPN) is a well-known microvascular complication of type 2 diabetes mellitus attributed to chronic hyperglycemia, and is defined as the presence of peripheral nerve dysfunction in diabetics after exclusion of other causes. [1–4] DPN leads to further infections, increasing the risk of foot ulcers and non-traumatic amputations. Neuropathic pain has been found to develop among 50 % of the individuals suffering from DPN, causing economic loss to the country. [5]

The literature on prevalence of DPN and it associated eterminants is scarce in north Indian population, hence this background this study was undertaken to study the prevalence of peripheral neuropathy in diabetes mellitus type-2 patients and to find the association between biochemical parameters like blood sugar (Fasting, PP), HbA_1c, lipid profile, 24-hours urinary albumen excretion with diabetic peripheral neuropathy.

Material and Methods: Study Design: This observational study was conducted on randomly selected patients of Diabetes Mellitus type-2 aged 30 years and above attending O.P.D., emergency and indoor wards of KPSIPGM and L.L.R. and Associated Hospital, GSVM Medical College Kanpur after institutional ethical committee approval.

Period of study:The present study was conducted over a span of 12 months from Feb 2006 to Jan 2007.

All the cases were interviewed using a structured Performa after taking their informed consent. A detailed clinical history was taken, complaints of the patients like polyuria, polydipsia, polyphasia, tingling sensation, burning sensation, pain in feet were noted. A thorough clinical examination was done.

Diagnosis of peripheral neuropathy was made on the basis of history, clinical examination, vibration perception with the help of biothesiometer.

With the help of biothesiometer vibration threshold reading over great toe, first Meta tarsal, third Meta tarsal, fifth Meta tarsal, ankle, heel, mid of the feet were recorded and average of these values were evaluated. Vibratory threshold reading $\geq$20 volts was diagnosed as peripheral neuropathy.

Metabolic Parameters such as blood sugar (fasting , post-prandial and random), Hba_1c , Lipid profile, 24 hours urinary albumen excretion .

The diagnosis of diabetes was made on the basis of WHO criteria as given below:
A random plasma glucose of > 200 mg/dL (11.1 mmol/L), associated with symptoms of hyperglycaemia (polyuria polydipsia, unexplained weight loss).
A Fasting plasma glucose of > 126 mg/dL (7.0 mmol/L).
A 2-hour glucose of > 200 mg/dL (11.1 mmol/L) aften a 75- g gluco9se load in the OGTT.

Inclusion criteria : Subjects having fasting and post prandial glucose level higher than the above described criteria for diabetes mellitus type-2 were included.

Exclusion criteria: All the cases having peripheral neuropathy with etiology other than diabetes like metabolic neuropathy and drug induced peripheral neuropathy and disease in which the sensory system is involved were excluded. Subjects having Creatinine>2mg/dl, Specific neurology diseases (Multiple sclerosis, stroke etc), Other causes of neuropathy (B_{12} deficiency, alcoholism etc) and Loss of dorasalis pedis pulses were excluded.

Statistical analysis was done. Mean , SD = Standard Deviation, r = Correlation coefficient and P-value was calculated.

In this Multiple Regression – Correlation study, diabetic peripheral neuropathy was treated as dependent variable and the metabolic parameters were taken as independent variables.

Results:

Majority of patients (57.84%) was aged 60 years an above. (Table 1) Out of 102 diabetes patients, 62 had peripheral neuropathy. Thus prevalence of diabetic neuropathy in our study was 60.7%.

Table 1: Age and gender wise distribution of patients

Age group (yrs)	No. of patient with diabetes	Percentage
30-44	13	12.75
45-59	30	29.41
60 and above	59	57.84
Gender		
Male	49	48.04
Female	53	51.96

Table 2: Biochemical parameters associated with Diabetics having peripheral neuropathy (VPT>20 volts)

Variable	Patients with neuropathy	r-value	p-value
Blood sugar (fasting)	172±40.17	0.391	<0.01
Blood sugar (pp)	265±41.67	0.313	<0.02
HbA_1c	8±1.93	0.289	>0.05
Total cholesterol	215±41.34	0.098	>0.10
24-HRS Urinary Albumen Excretion (mg/dL)	335±158.71	0.046	>0.10

Significant association between high blood sugar and peripheral neuropathy was found. Insignificant associations between HbA_1c, total cholesterol, 24-hours urinary albumen excretion were found. (table 2)

Figure 1: Peripheral neuropathy and age of diabetics

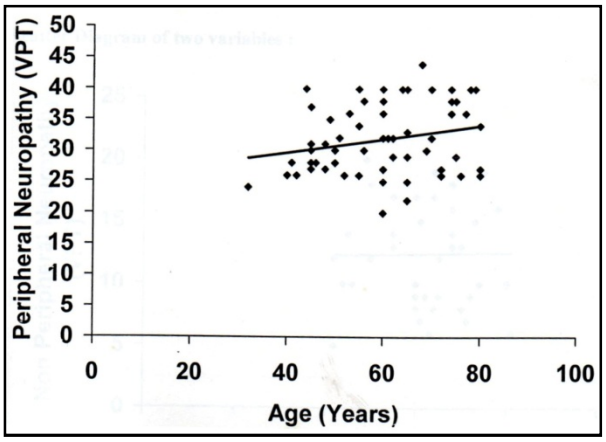
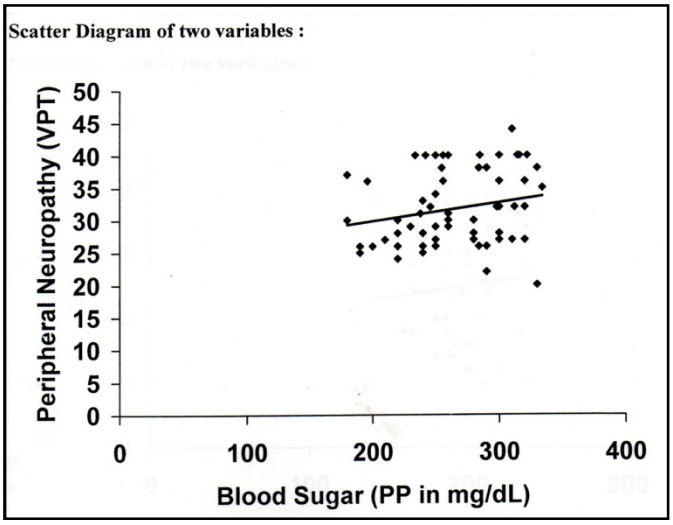
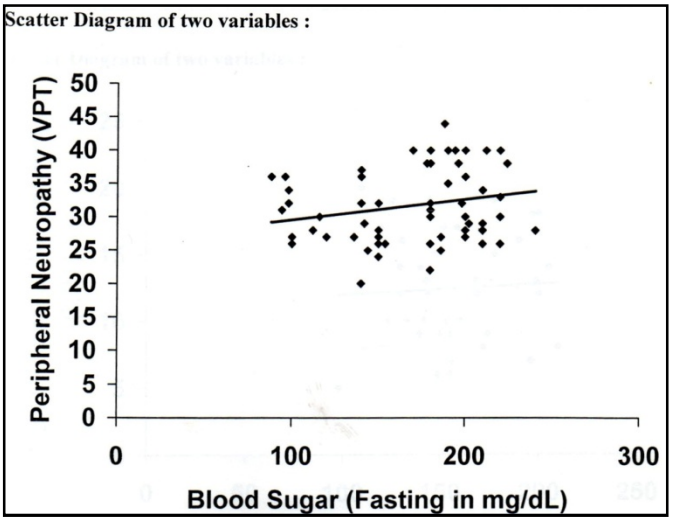


Figure 2 & 3: Peripheral neuropathy and blood sugar





Discussion: In this study prevalence of diabetic peripheral neuropathy was found to be 60% with the help of clinical examination and vibration perception. Bansal et al [5] in Chandigarh found that DPN accounted for 29.2% prevalence using clinical examination and vibration perception threshold test. The prevalence of DPN using the Michigan Neuropathy Screening Instrument examination was found to be 32.2% in a Manglore study by D'Souza et al [6]. Prevalence of peripheral neuropathy was found to be 25.6% based on the MNSI-sign score of ≥ 3 in UAE by Al-Kaabi et al [7].

This variation in DPN prevalence can be attributed to the different types of diagnostic criteria used in these studies. A significant corelation between high blood sugar and peripheral neuropathy was found in this study. Similar results were observed by Poncelet et al [8] and Adgaonkar et al [9]. Dutta et al [10] also found blood glucose to be a contributory factor in the development of diabetic peripheral neuropathy. Insignificant association was found between abnormal HbA_1c and diabetic peripheral neuropathy in this study which is similar to the results reported by Bansal et al [5]. On the contrary Boru et al [11] revealed that abnormal level of HbA_1c was a contributory factor for diabetic peripheral neuropathy. In the UAE study[7], an abnormal HbA1C level (odds ratio, 3.41) was found to be a significant predictor for odds of MSNI-history score ≥ 7.

Our study found no significant association between the total cholesterol level and diabetic peripheral neuropathy which is supported by Booya et al (2005)[12] and Tamer et al (2006)[13]. On the contrary, Dyslipidemia was found to be significantly associated with DPN in the Chandigarh study[5]. Insignificant association was also found between 24-hour urinary albumen excretion and diabetic peripheral neuropathy. Contradictory results have been reported by Varghese et al [14]. The limitation of our study is that this is a hospital based study which covers only a part of the diabetic population and the study conclusions cannot be applied to the general population.

Conclusion: Diabetes peripheral neuropathy was common in the study population and was associated with poor glycemic control. Thus screening of Diabetes mellitus and Diabetic peripheral neuropathy can be useful in its early detection and prompt treatment.

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