Original Article

Prevalence and Risk Factors of Diabetic Peripheral Neuropathy

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Abstract

Background: Diabetic peripheral neuropathy (DPN) is a prevalent and severe complication of diabetes mellitus, resulting in high morbidity in the form of foot ulcers, amputations, and reduced quality of life. Early detection and management of risk factors can reduce its burden.

Objective: To evaluate the prevalence of diabetic peripheral neuropathy (DPN) and determine its risk factors.

Methodology: This descriptive cross-sectional study was carried out at the Diabetic Clinic, Department of Medicine, Arif Memorial Teaching Hospital, Lahore, from January 2023 to December 2023. Consecutive sampling was used to enroll 200 diabetic patients. Demographic information, clinical history, blood pressure, and blood glucose levels were noted. All the participants were recommended HbA1c and lipid profile. DPN was evaluated by the Michigan Neuropathy Screening Instrument (MNSI), and the data were statistically analyzed.

Results: Among 200 patients, DPN was diagnosed in 83 patients (41.5%). Significant associations were found with increased duration of diabetes, hypertension, hyperglycemia, and pre-diabetes.

Conclusion: DPN prevalence continues to be high among diabetic patients. Early detection, strict control of glycemia, and treatment of related risk factors are the keys to avoid this disabling complication.

Keywords: Diabetic Neuropathy, Risk Factors, MNSI, HbA1c, Hyperglycemia.

Introduction:

Diabetic peripheral neuropathy (DPN) is one of the most prevalent diabetes complications, resulting in disability by causing foot ulcers, gait disturbances, and risks of falls. Peripheral neuropathy occurs when peripheral nerve dysfunction signs and symptoms are present, other causes excluded (2). The onset typically begins with sensory symptoms in the toes and gradually ascends, following a "glove and stocking" pattern. Early on, motor symptoms are minimal. Patients often report numbness, tingling, burning sensations, or hypersensitivity (1). Pain affects about 20–30% of patients and is a frequent reason for seeking medical care.

Patients with DPN face a significantly increased risk of falls (11) and lower-limb amputations (25). Hence, early diagnosis using tools such as HbA1c, vitamin B12 levels, and MNSI is critical. DPN incidence is influenced not just by hyperglycemia but also by factors like hypertension, obesity, hypertriglyceridemia, hypercholesterolemia, and smoking.

This study was conducted at Arif Memorial Teaching Hospital to determine the prevalence of DPN and its associated risk factors.

Methods:

This descriptive cross-sectional study was performed at the Diabetic Clinic, Department of Medicine, Arif Memorial Teaching Hospital, Lahore, from January to December 2023. A total of 200 diabetic patients were included through consecutive sampling.

After obtaining informed consent, demographic data, physical activity levels, physician visit frequency, diabetes duration, hypertension history, and medication details were recorded. Blood pressure and blood glucose were measured. Patients were advised to bring HbA1c and lipid profile results on follow-up.

The presence of DPN was assessed using the Michigan Neuropathy Screening Instrument (MNSI), which includes a symptom questionnaire and a physical examination component. MNSI has a sensitivity of 80% and specificity of 95% (7).

The diagnosis was based on a score of ≥7 out of 13 on the history questionnaire or ≥2 out of 10 on the physical exam.

Results:

Out of 200 diabetic patients included in the study, 140 (70%) were male and 60 (30%) were female. The patients' ages ranged from 16 to 70 years, with a mean age of 43.5 ± 26.5 years. Among them, 170 patients had type 2 diabetes mellitus, while 30 patients had type 1 diabetes mellitus. Hypertension was present in 82 patients (41%) and absent in 118 patients (59%). The mean BMI was 24 ± 3 kg/m².

Diabetic peripheral neuropathy (DPN) was detected in 83 patients, corresponding to a prevalence of 41.5%. Patients with DPN had a longer duration of diabetes (mean 11 ± 9.5

years) compared to those without DPN (mean 3.5 ± 2 years). The systolic blood pressure (SBP) was higher among DPN patients (153.5 ± 7.5 mmHg) than in patients without DPN (135 ± 23 mmHg), and a similar pattern was observed for diastolic blood pressure (91 ± 9 mmHg vs. 81 ± 10 mmHg).

Patients diagnosed with DPN exhibited higher mean fasting blood glucose levels (190 ± 60 mg/dl) compared to those without DPN (125 ± 25 mg/dl). Their mean HbA1c levels were also elevated (9.8 ± 2.2% vs. 6.4 ± 0.6%). Additionally, lipid profile abnormalities were more common among DPN patients, with total cholesterol levels of 193 ± 12 mg/dl versus 140 ± 15 mg/dl, LDL cholesterol of 102 ± 9 mg/dl compared to 78 ± 8 mg/dl, and lower HDL cholesterol (33 ± 9 mg/dl vs. 28 ± 5 mg/dl). Triglyceride levels were slightly higher among patients without DPN.

Regarding the frequency of risk factors, a diabetes duration of more than five years was observed in 62 (88%) of DPN patients. Hyperglycemia was found in 51 patients (72%), hypertension in 36 patients (52%), and pre-diabetes in 4 patients (13%) among those with DPN.

Table I. Baseline Characteristics of Study Participants

Characteristics	Value
Number of Patients	200
With Hypertension	82
Without Hypertension	118
Age (mean ± SD)	43.5 ± 26.5 years
Male	140
Female	60
BMI (mean ± SD)	24 ± 3
Type 1 Diabetes Mellitus	30
Type 2 Diabetes Mellitus	170

Table II. Clinical and Laboratory Features with and without DPN

Variables	With DPN (n=83)	Without DPN (n=117)
Duration of Diabetes (years)	11 ± 9.5	3.5 ± 2
Systolic BP (mmHg)	153.5 ± 7.5	135 ± 23
Diastolic BP (mmHg)	91 ± 9	81 ± 10
Fasting Blood Glucose (mg/dl)	190 ± 60	125 ± 25
HbA1c (%)	9.8 ± 2.2	6.4 ± 0.6
Total Cholesterol (mg/dl)	193 ± 12	140 ± 15
LDL (mg/dl)	102 ± 9	78 ± 8
HDL (mg/dl)	33 ± 9	28 ± 5
Triglycerides (mg/dl)	152 ± 7	160 ± 18

Table III. Frequency of Risk Factors Associated with DPN

Risk Factors	No. of Cases	Percentage (%)
Diabetes Duration > 5 years	62	88
Hyperglycemia	51	72
Hypertension	36	52
Pre-Diabetes	4	13

Discussion:

The present study found a DPN prevalence of 41.5%, consistent with findings from Saudi Arabia (45%), Iran (31.9%), UAE (56%), and India (9.2%) (18). Differences in prevalence rates across studies may be attributed to variations in diabetes types, disease duration, and diagnostic criteria.

A longer duration of diabetes, poor glycemic control, hypertension, and pre-diabetes were significantly associated with DPN. Intensive glycemic control can substantially reduce DPN incidence, particularly in type 1 diabetes patients (9). In contrast, its effectiveness in type 2 diabetes is limited (10).

Additionally, hypertension quadruples the risk of DPN over six years (23), and impaired glucose tolerance (pre-diabetes) independently increases neuropathy risk (20).

Limitations of the study include the lack of nerve conduction studies and a relatively small sample size.

Conclusion:

The prevalence of diabetic peripheral neuropathy is considerably high among patients at Arif Memorial Teaching Hospital. Early detection and strict management of hyperglycemia and associated risk factors are crucial to prevent this debilitating condition.

Authors' Contribution:

M.A. was responsible for data collection, initial analysis, and drafting of the manuscript. She actively participated in revising the content critically and approved the final version for submission.

Conflict of Interest:

Authors declare no conflict of interest.

Funding and Ethics:

This research was self-funded by the author.

The study was conducted in accordance with

ethical guidelines.

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