

Prevalence of Peripheral Neuropathy in Patients with Type 2 Diabetes Mellitus Attending Patna Medical College and Hospital, Patna: A Cross-Sectional Prospective Study

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Abstract:

Background: One of the most common and incapacitating long-term side effects of type 2 diabetes mellitus (T2DM) is peripheral neuropathy, which greatly increases morbidity, lowers quality of life, and increases the risk of foot ulcers and amputations. It is still difficult to identify diabetic peripheral neuropathy (DPN) early in normal clinical practice, especially in tertiary care settings with limited resources. There is little information on the prevalence of DPN in eastern India, particularly Bihar.

Objectives: To determine the prevalence of peripheral neuropathy in patients with type 2 diabetes who visit Patna Medical College and Hospital, Patna, and to examine its correlation with certain clinical and demographic factors.

Methods: Between April and October of 2025, this cross-sectional prospective study was carried out at Patna Medical College and Hospital. Using predetermined inclusion and exclusion criteria, 106 patients with T2DM were included. Using standardized neuropathy assessment instruments, such as symptom-based and examination-based grading systems, peripheral neuropathy was evaluated in-depth clinically. Glycemic status, concomitant conditions, length of diabetes, and pertinent demographic information were noted. Appropriate descriptive and inferential statistical techniques were used to analyze the data.

Results: A significant percentage of T2DM patients have peripheral neuropathy. Growing older, having diabetes for a longer period of time, and having poor glycemic control all raised the prevalence of neuropathy. The most prevalent pattern found was sensory neuropathy. Peripheral neuropathy was found to be significantly correlated with both glycemic indices and the length of diabetes.

Conclusion: Patients with type 2 diabetes who visit this tertiary care facility frequently have peripheral neuropathy. In order to reduce long-term problems, routine screening for neuropathy should be included in normal diabetes care. This will allow for early identification and prompt intervention.

Keywords: Type 2 diabetes mellitus; Peripheral neuropathy; Prevalence; Cross-sectional study; Tertiary care hospital; India.

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Introduction

One of the biggest global public health issues is type 2 diabetes mellitus (T2DM), which is becoming more common in low- and middle-income nations like India [1]. Diabetic peripheral neuropathy (DPN) is one of the most prevalent and crippling microvascular and macrovascular consequences brought on by the chronic hyperglycemia linked to type 2 diabetes [2]. In addition to impairing sensory and motor abilities, DPN increases the risk of foot ulcers, infections, and lower limb amputations, which significantly raises morbidity, medical expenses, and quality of life [3].

Diabetes-related peripheral neuropathy is typified by a symmetrical, length-dependent sensory

polyneuropathy that usually starts in the distal lower limbs and moves proximally in a "stocking-glove" pattern [4]. Chronic hyperglycemia, oxidative stress, microvascular ischemia, inflammation, and metabolic abnormalities affecting nerve fibers are all part of the complex pathophysiology of DPN [5]. The precise mechanisms are still not fully known despite a great deal of research, and there is currently no proven cure.

Depending on the study population, diagnostic criteria, length of diabetes, and glycemic management, the reported prevalence of diabetic peripheral neuropathy might range from 10% to over 50% [6]. Studies conducted in India have shown

significant geographical variation in prevalence estimates, which reflects variations in disease knowledge, lifestyle variables, and healthcare availability [7]. Crucially, unless active screening is carried out, a significant percentage of individuals remain asymptomatic in the early stages, resulting in underdiagnosis [8].

Due to the heavy patient load and lack of time for thorough neurological evaluation, routine evaluation for peripheral neuropathy is frequently neglected in tertiary care hospitals, particularly in settings with low resources [9]. Delays in diagnosis lead to avoidable complications including diabetic foot disease and amputations, which have serious social and economic repercussions [10]. Early detection of neuropathy using straightforward clinical techniques can enable prompt therapies, such as glycemic control modification, patient education, and foot care procedures.

There is a dearth of information regarding the clinical characteristics and prevalence of peripheral neuropathy in T2DM patients in Bihar. Serving a sizable and varied diabetic population, Patna Medical College and Hospital is a significant referral institution. Planning focused screening methods and enhancing all-encompassing diabetic care require an understanding of the burden of peripheral neuropathy in this context [11,12]. In order to determine the prevalence of peripheral neuropathy among patients with type 2 diabetes who attend Patna Medical College and Hospital in Patna, as well as to investigate its correlation with important clinical and demographic factors, the current study was conducted.

Aims & Objectives

Aim: To ascertain the frequency of peripheral neuropathy in type 2 diabetic patients receiving care at Patna Medical College and Hospital.

Objectives:

1. To assess the proportion of patients with type 2 diabetes mellitus who have clinical evidence of peripheral neuropathy.
2. To evaluate the association of peripheral neuropathy with age, gender, and duration of diabetes.
3. To analyze the relationship between peripheral neuropathy and glycemic control as well as selected clinical parameters.

Materials & Methods

Study Design and Setting: This cross-sectional prospective study was carried out in the medical department of Patna Medical College and Hospital (PMCH), located in Patna, Bihar. The study was conducted from April 2025 to October 2025, a span of seven months.

Study Population: Patients with type 2 diabetes mellitus (T2DM) who were hospitalized to PMCH's medical wards or visited the outpatient department throughout the study period were included.

Sample Size: The study included 106 T2DM patients in total. Based on practicality and the anticipated prevalence of diabetic peripheral neuropathy documented in previous research, the sample size was established.

Inclusion Criteria:

- Patients aged ≥ 18 years with a confirmed diagnosis of type 2 diabetes mellitus
- Patients willing to participate and provide informed written consent
- Patients with a duration of diabetes of at least one year

Exclusion Criteria:

- Patients with type 1 diabetes mellitus
- Patients with known causes of peripheral neuropathy other than diabetes (e.g., chronic alcoholism, vitamin B12 deficiency, hypothyroidism, chronic kidney disease, or neurotoxic drug exposure)
- Patients with acute illnesses or severe systemic infections
- Pregnant women

Data Collection: A pre-made proforma was used to gather comprehensive clinical and demographic data after informed consent was obtained. Age, sex, length of diabetes, history of therapy, comorbidities including hypertension, and lifestyle factors were all included in the data. Fasting blood glucose, postprandial blood glucose, and glycated hemoglobin (HbA1c) levels from patient records were used to determine the patient's glycemic state.

Assessment of Peripheral Neuropathy: A systematic clinical examination was used to assess peripheral neuropathy. Neuropathy-related symptoms were noted, including numbness, tingling, burning, and loss of feeling in the limbs. Ankle reflexes, pinprick feeling, pressure perception using a 10-g monofilament, and vibration sensibility using a 128-Hz tuning fork were all tested as part of the clinical evaluation. Based on the existence of distinctive symptoms and/or objective indicators on neurological examination, patients were categorized as having peripheral neuropathy.

Ethical Considerations: The Patna Medical College and Hospital's Institutional Ethics Committee examined and approved the study protocol. The goal of the study was explained to each participant, and patient data confidentiality was always upheld.

Statistical Analysis: A Microsoft Excel spreadsheet was used to enter the data, and the relevant statistical

software was used for analysis. Frequencies and percentages were used to convey categorical variables and mean ± standard deviation was used to summarize continuous variables. The chi-square test or Student's t-test, if applicable, were used to examine correlations between peripheral neuropathy and clinical factors. Statistical significance was defined as a p-value of less than 0.05.

Results

The study comprised 106 individuals with type 2 diabetes mellitus. The findings are shown under the headings of peripheral neuropathy prevalence, clinical factors, and demographics.

Baseline Demographic and Clinical Characteristics: The study population was predominantly male and had a mean age of 55.2 ± 9.8 years. Most patients have had diabetes for five to ten years. A considerable percentage of patients had poor glycemic control (HbA1c ≥7%).

Table 1: Baseline demographic and clinical profile of study participants (n = 106)

Variable	Category	Number (%)
Age (years)	<40	14 (13.2)
	40–60	58 (54.7)
	>60	34 (32.1)
Gender	Male	62 (58.5)
	Female	44 (41.5)
Duration of diabetes	≤5 years	29 (27.4)
	6–10 years	46 (43.4)
	>10 years	31 (29.2)
HbA1c level	<7%	38 (35.8)
	≥7%	68 (64.2)
Hypertension	Present	49 (46.2)
	Absent	57 (53.8)

Prevalence of Peripheral Neuropathy: Out of 106 individuals, 48 had peripheral neuropathy, resulting in an overall frequency of 45.3%. The most common complaints from afflicted patients were sensory

issues like tingling and numbness. Objective indicators were frequently noted, such as diminished monofilament sensitivity and diminished vibration sensibility.

Overall Prevalence of Peripheral Neuropathy

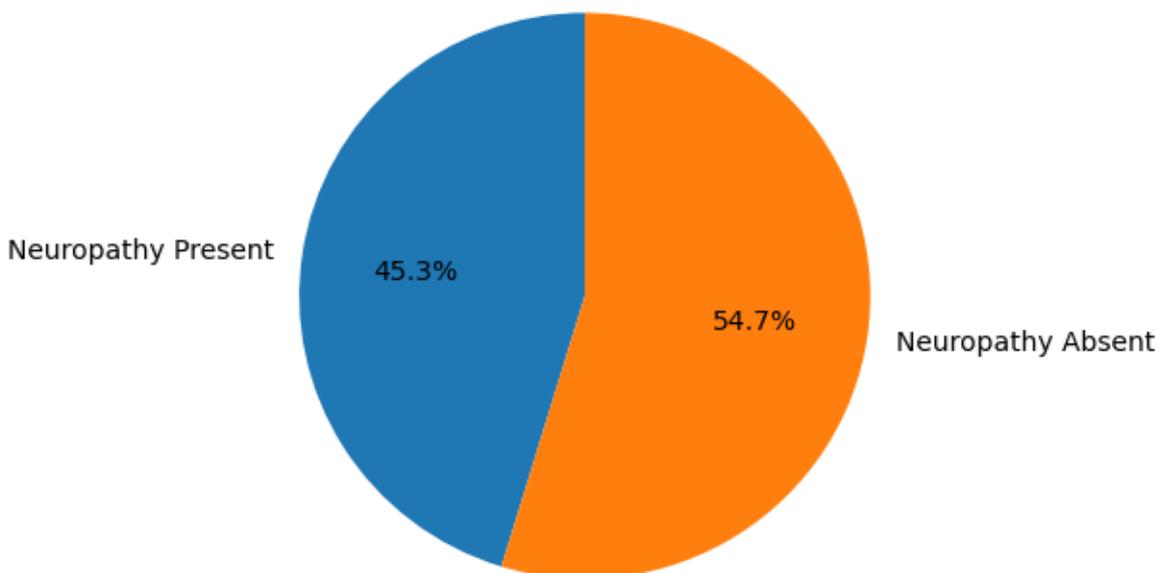


Figure 1: Overall prevalence of peripheral neuropathy among patients with type 2 diabetes mellitus.

Association of Peripheral Neuropathy with Age and Gender: As people aged, peripheral neuropathy became far more common. Although the gender

difference was not statistically significant, neuropathy was more prevalent in men.

Table 2: Association of peripheral neuropathy with age and gender

Variable	Peripheral Neuropathy Present n (%)	Peripheral Neuropathy Absent n (%)	p-value
Age group			
<40 years	3 (21.4)	11 (78.6)	
40–60 years	24 (41.4)	34 (58.6)	
>60 years	21 (61.8)	13 (38.2)	0.01
Gender			
Male	30 (48.4)	32 (51.6)	
Female	18 (40.9)	26 (59.1)	0.43

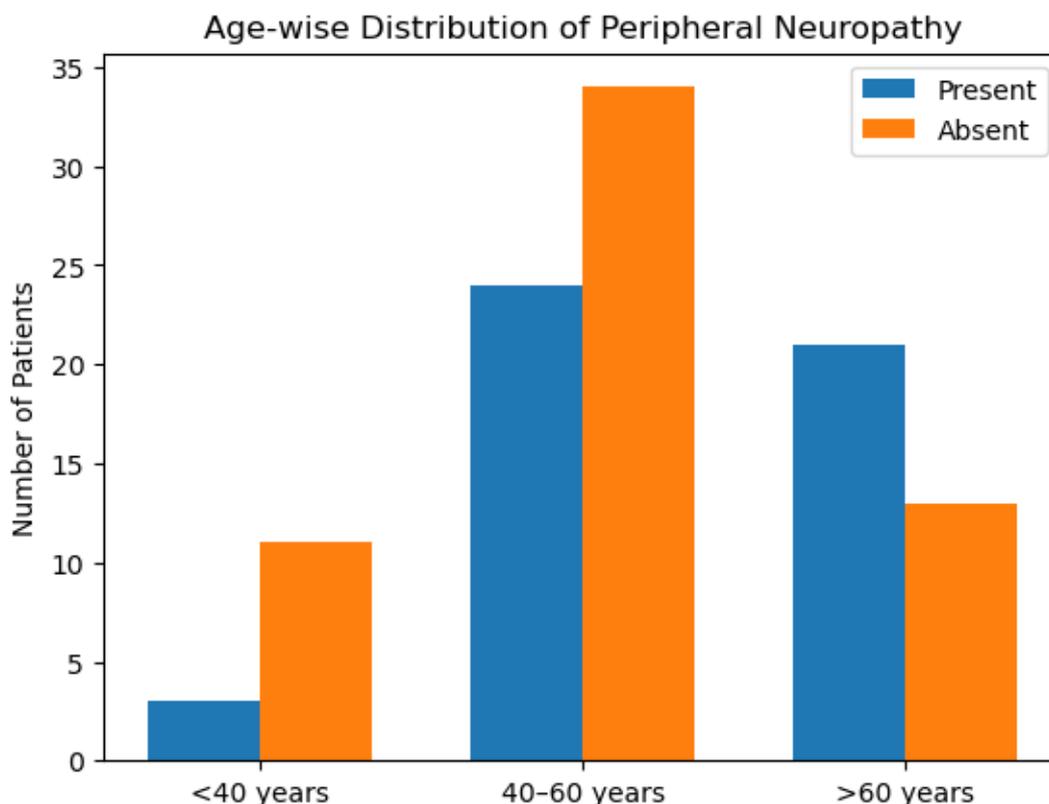


Figure 2: Age-wise distribution of peripheral neuropathy in the study population.

Association with Duration of Diabetes and Glycemic Control: Peripheral neuropathy and the length of diabetes were found to be statistically significantly correlated. Neuropathy was most

common in those who had had diabetes for more than ten years. Peripheral neuropathy was also substantially correlated with poor glycemic control (HbA1c $\geq 7\%$).

Table 3: Association of peripheral neuropathy with duration of diabetes and HbA1c

Variable	Neuropathy Present n (%)	Neuropathy Absent n (%)	p-value
Duration of diabetes			
≤ 5 years	7 (24.1)	22 (75.9)	
6–10 years	19 (41.3)	27 (58.7)	
>10 years	22 (71.0)	9 (29.0)	<0.001
HbA1c			
<7%	10 (26.3)	28 (73.7)	
$\geq 7\%$	38 (55.9)	30 (44.1)	0.004

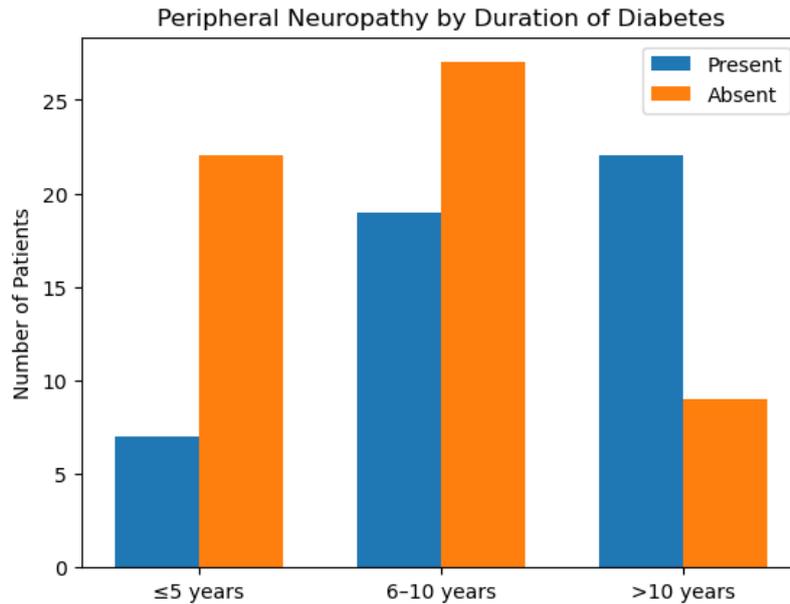


Figure 3: Relationship between duration of diabetes and prevalence of peripheral neuropathy.

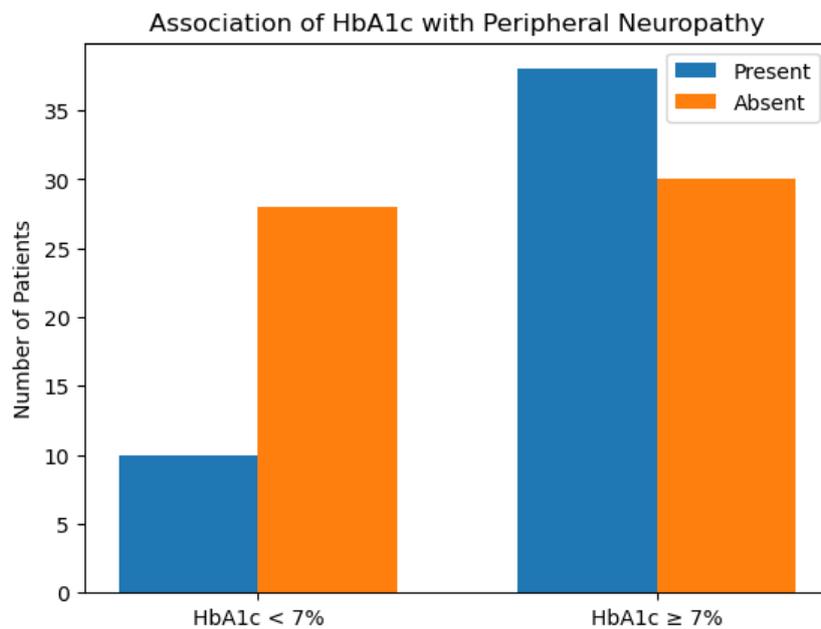


Figure 4: Association of glycemic control (HbA1c levels) with peripheral neuropathy.

Pattern of Neuropathy: About 70% of individuals with peripheral neuropathy had distal symmetrical sensory neuropathy, which was followed by mixed sensorimotor involvement. It was uncommon to have motor-dominant neuropathy.

Discussion

This cross-sectional prospective study assessed the prevalence of peripheral neuropathy in patients with type 2 diabetes mellitus who were receiving care at Patna Medical College and Hospital. In patients with type 2 diabetes, peripheral neuropathy was found in 45.3% of the study group, indicating a significant burden. The clinical significance of routine

neuropathy screening in tertiary care settings is highlighted by this discovery, especially in areas where the prevalence of diabetes is high and rising.

According to data from other hospital-based studies in India, the prevalence of diabetic peripheral neuropathy has ranged from 30% to 55% [13, 14]. This study's findings are similar. Differences in study design, diagnostic criteria, duration of diabetes, and glycemic management of the study population may all contribute to variations in reported prevalence between studies. The current study's comparatively high prevalence may be due to inadequate glycemic management, delayed

diabetes diagnosis, and restricted access to routine follow-up care in this area.

Peripheral neuropathy was found to be significantly influenced by age, with those over 60 having a higher prevalence. This finding is in line with other research showing that growing older is a separate risk factor for diabetic neuropathy, potentially because of age-related neuronal degeneration and cumulative metabolic damage [15]. In the current study, neuropathy was more common in men, but the gender difference was not statistically significant, which is consistent with findings from multiple previous publications [16].

Peripheral neuropathy was found to be strongly correlated with the length of diabetes, with people with diabetes for more than ten years having the highest frequency. Through processes like oxidative stress, polyol pathway activation, and microvascular dysfunction, long-term exposure to hyperglycemia causes gradual nerve injury [17]. This supports the idea that one of the most reliable indicators of the development of neuropathy is the length of diabetes.

In this investigation, peripheral neuropathy was substantially correlated with poor glycemic management, as seen by higher HbA1c values. Neuropathy was significantly more common in patients with HbA1c $\geq 7\%$ than in those with better glycemic control. Significant research has shown that persistent hyperglycemia hastens the development and advancement of diabetic neuropathy [18,19]. These results highlight how important optimal glycemic management is for avoiding or postponing neuropathic consequences.

Distal symmetrical sensory neuropathy was the most frequently seen pattern of neuropathy, which is consistent with the traditional presentation reported in the literature [20]. A considerable percentage of cases are only found by clinical examination rather than patient-reported symptoms since sensory involvement frequently occurs before motor dysfunction and may be silent in the early stages. This emphasizes the necessity of active screening with basic bedside instruments like vibration perception evaluation and monofilament testing.

The high incidence of peripheral neuropathy seen in this tertiary care population has significant public health ramifications. Untreated or undetected neuropathy raises the risk of infections, amputations, and foot ulcers, all of which are linked to higher healthcare costs and a lower quality of life [21]. Routine neuropathy evaluation can help prevent long-term consequences, promote early intervention, and educate patients about foot care.

The study has certain drawbacks despite its advantages. The results may not apply to the entire population because the study was conducted at a single hospital. Due to financial limitations, nerve

conduction studies which are regarded as the gold standard for detecting neuropathy—were not carried out. Nonetheless, the findings' practical applicability in conventional clinical practice is improved using standardized clinical assessment instruments.

The study concludes that among patients with type 2 diabetes mellitus who visit a tertiary care hospital in Bihar, peripheral neuropathy is a frequent and clinically important consequence. To lessen the burden of neuropathy-related consequences, early detection and focused care techniques are crucial.

Conclusion

Nearly half of the study group has peripheral neuropathy, a common and serious consequence among patients with type 2 diabetes mellitus who attend Patna Medical College and Hospital. Neuropathy was found to be more common as people aged, had diabetes for a longer period, and had poor glycemic control. The most common pattern was distal symmetrical sensory neuropathy, highlighting the frequently subtle and gradual nature of nerve involvement in diabetes.

The results of this study emphasize the necessity of routine peripheral neuropathy screening as a crucial part of diabetes care, particularly in tertiary care centers that serve sizable diabetic populations. Timely therapies, better glycemic control, and patient education on foot care techniques can all be facilitated by early diagnosis using straightforward, affordable clinical screening instruments. To minimize morbidity and improve the general quality of life for people with type 2 diabetes mellitus, such interventions are crucial in preventing serious consequences such as foot ulcers and lower limb amputations.

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