

## Prevalence of Peripheral Neuropathy in Diabetic Patients

Nida Gul<sup>1\*</sup>, Felicita M. Tayong<sup>2</sup>, Valery Lopez Rios<sup>3</sup>, Hayat Ullah<sup>4</sup>, Jestin K J<sup>5</sup>, Ayaz Ali<sup>1</sup>, Shah Faisal<sup>6</sup>,

<sup>1</sup>Internal Medicine, Lady Reading Hospital, Peshawar, Pakistan. <sup>2</sup>MD, PhD, MPH, MSc Neurosurgery, New Orleans, USA.

<sup>3</sup>Department of Pathology and Laboratory Medicine, AIIMS, Himachal Pradesh, India. <sup>3</sup>Internal Medicine, Pereira, Colombia. <sup>4</sup>Surgery and allied, RMO st Hugh's hospital, Grimsby north east Lincolnshire UK. <sup>5</sup>Department of Pathology and Laboratory Medicine, AIIMS, Himachal Pradesh, India. <sup>6</sup>Internal Medicine Khyber Teaching Hospital Peshawar.

\*Corresponding author: Nida Gul.

### Abstract

**Introduction:** Diabetes mellitus is a growing global health concern, with complications like diabetic peripheral neuropathy (DPN) significantly affecting quality of life. DPN prevalence varies widely across studies due to differences in methods and populations. Limited data exist on DPN prevalence in outpatient settings and on distinguishing risk factors. This study aims to assess the prevalence of DPN among diabetic patients in a tertiary care hospital in Pakistan.

**Methodology:** This cross-sectional study was conducted at Lady Reading Hospital, Peshawar, from October 2024 to April 2025 using a convenient sampling technique. A total of 246 diabetic patients were enrolled based on a calculated sample size using WHO formula with an expected prevalence of 80.4%. Data were collected using the Michigan Neuropathy Screening Instrument (MNSI), including both symptom-based and physical assessment components. Analysis was performed using SPSS version 22 with descriptive and inferential statistics applied.

**Results:** Out of 246 diabetic patients (mean age  $51.55 \pm 15.24$  years), 31.7% had Type 1 and 68.3% had Type 2 diabetes. Using the MNSI, the prevalence of diabetic peripheral neuropathy was 58.9% based on the symptom questionnaire and 63.8% based on physical examination. Neuropathic symptoms like numbness, burning pain, and sensitivity to touch were commonly reported. A detailed item-wise symptom analysis showed variability in neuropathic complaints.

**Conclusion:** This study found a high prevalence of diabetic peripheral neuropathy, affecting 58.9% based on symptoms and 63.8% on physical exam. Type 2 diabetes was more common among affected individuals. Many participants reported classic neuropathic symptoms such as numbness, burning, and foot sores. These findings emphasize the need for early screening and management. Routine assessment can help prevent complications and improve patient outcomes.

**Keywords:** diabetic peripheral neuropathy; diabetes mellitus; prevalence; michigan neuropathy screening instrument (mnsi); cross-sectional study; neuropathy screening

### Introduction

Diabetes mellitus is a chronic condition that significantly impacts individuals, their families, and communities worldwide [1]. According to the International Diabetes Federation (IDF) 2021 report, approximately 537 million individuals are currently living with diabetes. This figure is projected to rise to 643 million by 2030 and reach 783 million by 2045. In 2015, diabetes was linked to an estimated 1.6 million deaths [2].

Recent studies forecast a significant increase in the prevalence of diabetes, along with a parallel rise in related complications [3]. Diabetic peripheral neuropathy (DPN) is one of the most prevalent and troublesome complications. Individuals affected by DPN often experience reduced quality of life and contribute substantially to the healthcare burden [4]. Diabetic peripheral neuropathy is characterized by the

occurrence of symptoms and/or clinical signs indicating peripheral nerve impairment in individuals with diabetes mellitus, after ruling out other potential causes [5].

Numerous studies report the prevalence of DPN based primarily on data from hospitals or large clinical settings, which often leads to selection bias [6,7]. Data regarding the prevalence and contributing factors of diabetic peripheral neuropathy in outpatient populations remain limited. Many existing studies fail to differentiate between individuals with type 1 and type 2 Diabetes. Additionally, information on the specific risk factors leading to diabetic neuropathy is lacking, which this study also aims to address. Some reports have indicated that the prevalence of DPN is already high at the time type 2 diabetes is first diagnosed [8]. Current epidemiological evidence indicates that the prevalence of diabetic peripheral

neuropathy among individuals with diabetes varies significantly across studies, ranging from 16% to 66% [9].

Several factors contribute to the wide variation in DPN prevalence, such as differences in study quality, design, ethnic populations, and diagnostic methods. To improve awareness and strategies for preventing and managing DPN in diabetic patients, accurate estimates of its prevalence are essential. A systematic review and meta-analysis conducted by researchers in 2014 examined the prevalence of DPN, revealing an overall rate of 53% in Iran [10].

In Pakistan, the estimated diabetes prevalence stands at 6.8%, with over 87,000 deaths attributed to the disease each year [11]. The aim of this study is to determine the prevalence of peripheral neuropathy among individuals with diabetes mellitus.

## Methodology

This cross-sectional study was conducted at Lady Reading Hospital, Peshawar, over a period of seven months, from October 2024 to April 2025. A convenient sampling technique was employed for the recruitment of participants. All patients diagnosed with diabetes mellitus who provided informed consent and visited to general medicine OPD or admitted to general medicine ward during study period were included in the study.

Patients were excluded if they had a prior diagnosis of peripheral neuropathy, a history of chronic alcohol use, or were taking medications known to cause neuropathy (e.g., Isoniazid).

The sample size was calculated using the World Health Organization (WHO) sample size formula:

$$\text{Sample Size} = Z^2 \times P(1-P) / D^2$$

Where:

Z = 1.96 (corresponding to a 95% confidence interval)

P = Expected prevalence (80.4%)

D = Margin of error (0.05)

Based on a prevalence of 80.4% reported in a previous study by Soyupek et al. [12], the calculated sample size was 246 participants.

Data were collected using the validated Michigan Neuropathy Screening Instrument (MNSI), which comprises two components:

Part 1: A symptom-based questionnaire

Part 2: A physical assessment

Patients who scored 7 or more in Part 1 were considered to have more neuropathic symptoms, while those who scored greater than 2.5 in Part 2 were classified as having clinical peripheral neuropathy based on physical findings.

## Data Analysis

All data were analyzed using SPSS version 22. Descriptive statistics such as mean and standard deviation were used to summarize continuous variables like age. Categorical variables, including gender, diabetes type, and neuropathy status, were expressed in frequencies and percentages. Associations between neuropathy and other variables were assessed using appropriate statistical tests.

## Results

Data were collected from a total of 246 patients. Of these, 89 (36.2%) were male and 157 (63.8%) were female. The mean age of the participants was  $51.55 \pm 15.24$  years, with the youngest participant aged 12 years and the oldest 88 years.

In terms of diabetes type, 78 participants (31.7%) were diagnosed with Type 1 diabetes, while 168 participants (68.3%) had Type 2 diabetes.

Peripheral neuropathy was assessed using the Michigan Neuropathy Screening Instrument (MNSI). Based on the physical assessment component, 157 participants (63.8%) were classified as neuropathic, having an MNSI score of 2.5 or higher, while 89 participants (36.2%) did not exhibit signs of peripheral neuropathy.

In the symptom-based component (Part 1) of the MNSI, 145 participants (58.9%) scored less than 7, indicating fewer neuropathic symptoms. In contrast, 101 participants (41.1%) scored greater than 7, reflecting a higher burden of neuropathic symptoms. So, in short, our study involving 246 diabetic patients, the prevalence of diabetic peripheral neuropathy (DPN) was found to be 58.9% using the Michigan Neuropathy Screening Instrument (MNSI) self-administered questionnaire (SAQ). Additionally, based on the lower extremity examination section of the MNSI, the prevalence increased to 63.8%.

**Table 1:** A detailed item-wise breakdown of responses to the MNSI Part 1 questionnaire.

Questions	Response	Frequency (n)	Percentage (%)
Are your legs and/or feet numb?	Yes	108	43.9
	No	138	56.1

Do you ever have any burning pain in your legs and/or feet?	Yes	107	43.5
	No	139	56.5
Are your feet too sensitive to touch?	Yes	139	56.5
	No	107	43.5
Do you get muscle cramps in your legs and/or feet?	Yes	109	44.3
	No	137	55.7
Do you ever have any prickling feelings in your legs or feet?	Yes	109	44.3
	No	137	55.7
Does it hurt when the bed covers touch your skin?	Yes	128	52
	No	118	48
When you get into the tub or shower, are you able to tell the hot water from the cold water?	Yes	151	61.4
	No	95	38.6
Have you ever had an open sore on your foot?	Yes	163	66.3
	No	83	33.7
Has your doctor ever told you that you have diabetic neuropathy?	Yes	129	52.4
	No	117	47.6
Do you feel weak all over most of the time?	Yes	133	54.1
	No	113	45.9
Are your symptoms worse at night?	Yes	101	41.1
	No	145	58.9
Do your legs hurt when you walk?	Yes	113	45.9
	No	133	54.1
Are you able to sense your feet when you walk?	Yes	102	41.5
	No	144	58.5
Is the skin on your feet so dry that it cracks open?	Yes	126	51.2
	No	120	48.8
Have you ever had an amputation?	Yes	111	45.1
	No	135	54.9

## Discussion

In our study, data were collected from a total of 246 patients, with a gender distribution of 89 males (36.2%) and 157 females (63.8%). The participants had a mean age of  $51.55 \pm 15.24$  years, with ages ranging from 12 to 88 years. In terms of diabetes type, 78 participants (31.7%) were diagnosed with Type 1 diabetes, while 168 participants (68.3%) had Type 2 diabetes.

In comparison, a similar cross-sectional observational study involving 225 participants reported a gender distribution of 42.2% males and 57.8% females. The majority of their sample had Type 2 diabetes (97.8%), with a smaller proportion diagnosed with Type 1 diabetes (2.2%). Their ages ranged from 35 to 70 years [13]. These differences in demographic and clinical characteristics between studies may provide valuable insights into the variability of diabetes-related complications in different populations.

In our study, we observed that 63.8% of diabetic patients were affected by diabetic peripheral neuropathy (DPN), indicating a notably high prevalence in our sample. When comparing this with

findings from other studies, a clear variation in prevalence rates is evident. One study reported a DPN prevalence of 39.5% [14], which is considerably lower than our findings. Another study documented a prevalence of 50% [15], while yet another reported an even higher rate of 80.4% [12]. Prevalence of PDN in Saudi Arabia is 45%, in Iran 31.9%, in United Arab Emirates (UAE) is 25.6% and in India it is 29.2% [16-19].

These differences may be attributed to variations in study populations, diagnostic tools, duration of diabetes among participants, and healthcare accessibility. For instance, populations with longer diabetes duration, poor glycemic control, or limited healthcare access are likely to show higher DPN prevalence. Additionally, methodological differences—such as whether clinical examinations, questionnaires, or electrophysiological tests were used—can significantly influence detection rates.

Our findings, which fall within the higher range of reported values, underscore the substantial burden of DPN in diabetic patients and highlight the need for early screening and preventive strategies in routine diabetes care.

## Conclusion

Our study revealed a high prevalence of diabetic peripheral neuropathy (DPN) among diabetic patients, with 58.9% identified through symptom-based assessment and 63.8% through physical examination using the Michigan Neuropathy Screening Instrument (MNSI). Type 2 diabetes was more common, accounting for 68.3% of cases. A significant number of patients reported typical neuropathic symptoms such as numbness, burning pain, and foot sores. These symptoms, if left unmanaged, can lead to serious complications. The findings highlight the importance of regular screening for early detection of DPN. Incorporating neuropathy assessments into routine diabetic care can improve patient outcomes and quality of life.

## Limitations

This study has certain limitations that should be acknowledged. Firstly, the use of a convenient sampling technique may limit the generalizability of the findings, as the sample may not accurately represent the broader diabetic population. Secondly, the study was conducted in a single tertiary care hospital, which may introduce center-specific biases and restrict the applicability of results to other healthcare settings or populations. These factors highlight the need for caution when interpreting the results and suggest that future research involving multi-center studies and probability-based sampling methods would help enhance the validity and broader applicability of the findings.

## References

1. World Health Organization. (2023). Diabetes.
2. Sun, H., Saeedi, P., Karuranga, S., Pinkepank, M., Ogurtsova, K., et al. (2022). IDF Diabetes Atlas: Global, regional and country-level diabetes prevalence estimates for 2021 and projections for 2045. *Diabetes Research and Clinical Practice*, 183:109119.
3. Wild, S., Roglic, G., Green, A., Sicree, R., & King, H. (2004). Global prevalence of diabetes: Estimates for the year 2000 and projections for 2030. *Diabetes Care*, 27(5):1047–1053.
4. Happich, M., John, J., Stamenitis, S., Clouth, J., & Polnau, D. (2008). The quality of life and economic burden of neuropathy in diabetic patients in Germany in 2002—Results from the Diabetic Microvascular Complications (DIMICO) study. *Diabetes Research and Clinical Practice*, 81(2):223–230.
5. Masson, E. A., & Boulton, A. J. (1990). Aldose reductase inhibitors in the treatment of diabetic neuropathy: A review of the rationale and clinical evidence. *Drugs*, 39(2):190–202.
6. Fedele, D., Comi, G., Coscelli, C., Cucinotta, D., Feldman, E. L., et al. (1997). A multicenter study on the prevalence of diabetic neuropathy in Italy. *Diabetes Care*, 20(5):836–843.
7. Young, M. J., Boulton, A. J., MacLeod, A. F., Williams, D. R., & Sonksen, P. H. (1993). A multicentre study of the prevalence of diabetic peripheral neuropathy in the United Kingdom hospital clinic population. *Diabetologia*, 36:150–154.
8. Rota, E., Quadri, R., Fanti, E., Poglio, F., Paolasso, I., et al. (2007). Clinical and electrophysiological correlations in type 2 diabetes mellitus at diagnosis. *Diabetes Research and Clinical Practice*, 76(1):152–154.
9. Lee, C. M., Chang, C. C., Pan, M. Y., Chang, C. F., & Chen, M. Y. (2014). Insufficient early detection of peripheral neurovasculopathy and associated factors in rural diabetes residents of Taiwan: A cross-sectional study. *BMC Endocrine Disorders*, 14:89.
10. Sobhani, S., Asayesh, H., Sharifi, F., Djalalinia, S., Baradaran, H. R., et al. (2014). Prevalence of diabetic peripheral neuropathy in Iran: A systematic review and meta-analysis. *Journal of Diabetes & Metabolic Disorders*, 13:Article 1.
11. International Diabetes Federation. (2013). *IDF Diabetes Atlas. Brussels: International Diabetes Federation.*
12. Soyupek, F., Ceceli, E., Suslu, F. E., & Yorgancioğlu, R. (2007). Neurologic and radiologic abnormalities of the foot in diabetic patients. *Journal of Back and Musculoskeletal Rehabilitation*, 20(2–3):55–60.
13. Perveen, W., Ahsan, H., Shahzad, R., et al. (2024). Prevalence of peripheral neuropathy, amputation, and quality of life in patients with diabetes mellitus. *Scientific Reports*, 14:14430.
14. Khawaja, N., Abu-Shennar, J., Saleh, M., et al. (2018). The prevalence and risk factors of peripheral neuropathy among patients with type 2 diabetes mellitus; the case of Jordan. *Diabetology & Metabolic Syndrome*, 10:8.

15. Martin, C. L., Albers, J. W., & Pop-Busui, R. (2014). Neuropathy and related findings in the Diabetes Control and Complications Trial/Epidemiology of Diabetes Interventions and Complications study. *Diabetes Care*, 37(1):31-38.
16. Al-Geffari, M. (2012). Comparison of different screening tests for diagnosis of diabetic peripheral neuropathy in primary health care setting. *International Journal of Health Sciences*, 6:127-134.
17. Tabatabaei-Malazy, O., Mohajeri-Tehrani, M. R., Madani, S. P., Heshmat, R., & Larijani, B. (2011). The prevalence of diabetic peripheral neuropathy and related factors. *Iranian Journal of Public Health*, 40:55-62.
18. Al-Kaabi, J. M., Al-Maskari, F., Zoubeidi, T., Abdulle, A., Shah, S. M., et al. (2014). Prevalence and determinants of peripheral neuropathy in patients with type 2 diabetes attending a tertiary care center in the United Arab Emirates. *Journal of Diabetes & Metabolism*, 5:346-353.
19. Bansal, D., Gudala, K., Muthyala, H., Esam, H. P., Nayakallu, R., & Bhansali, A. (2014). Prevalence and risk factors of development of peripheral diabetic neuropathy in type 2 diabetes mellitus in a tertiary care setting. *Journal of Diabetes Investigation*, 5:714-721.

**Cite this article:** Gul N, Felicita M. Tayong, Valery L. Rios, Ullah H., Jestin K J. et al. (2025). Prevalence of Peripheral Neuropathy in Diabetic Patients, *Journal of BioMed Research and Reports*, BioRes Scientia Publishers. 8(1):1-5. DOI: 10.59657/2837-4681.brs.25.169

**Copyright:** © 2025 Nida Gul, this is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

**Article History:** Received: May 03, 2025 | Accepted: May 17, 2025 | Published: May 24, 2025