

THE PREVALENCE OF PERIPHERAL DIABETIC NEUROPATHY IN PATIENTS WITH DIABETES MELLITUS

Gohar Ali Khan¹, Muhammad Sohrab Khan,² Rahmat Ali³, Motasim Billah⁴, Bilal Kifayat Orakzai⁵, Shams Ur Rehman⁶,

ABSTRACT

Peripheral Diabetic Neuropathy (PDN) is a common complication of Diabetes Mellitus (DM), which can negatively impact a patient's quality of life. The study was aimed at the prevalence of PDN in patients with DM. This cross-sectional study was conducted in Bacha Khan Medical Complex Swabi, with a total of 246 patients having DM over a period of 6 months. SPSS-20 was used for statistical interpretation. Among the total number of patients, 119 were male and 127 were female. 27 (47.4%) males and 30 (52.6%) females were diagnosed with PDN. The mean age was recorded as 46.43±16.13. It was observed that 77 (66.4%) patients belonged to the age group of 41 to 65 years of age. The prevalence of PDN was found to be 47.2%. Age was found to be significant, while gender was insignificant. The results of this study indicate a relatively high prevalence of peripheral neuropathy in people with diabetes.

KEY WORDS: Diabetes Mellitus, Peripheral Diabetic Neuropathy, Pakistan

✉ Assistant Professor Department of Medicine, Bacha Khan Medical College, MMC, Mardan, Khyber Pakhtunkhwa, Pakistan.

@ Sohrab_dr2002@hotmail.com

☎ 0333-6047703

1. Department of Medicine, Bannu Medical College, Bannu, Khyber Pakhtunkhwa, Pakistan.

2. Department of Medicine, Gajju Khan Medical College, Swabi, Khyber Pakhtunkhwa, Pakistan.

Received: February 3, 2017, Revised: June 08, 2023, Accepted: June 13, 2023

INTRODUCTION

Diabetes Mellitus (DM) is considered a major health hazard around the globe. ¹. It is more prevalent among older adults than younger ones. DM is a serious metabolic condition that affects a huge population of the world and burdens the economy worldwide with a gradual increase in the number of patients. Adults are at higher risk with the alarming numbers of 382 million people across the world. These numbers are likely to increase to 592 million by the year 2035 ². In 2021, the International Diabetes Federation (IDF) released a poll that predicted 537 million individuals globally had diabetes mellitus (DM), with 33 million of those cases occurring in Pakistan. According to IDF estimates, 26.7% of adults in Pakistan have type 2 diabetes ³. Having diabetes makes one prone to diabetes neuropathy, which is a type of nerve damage all over the body that can alter autonomic motor and sensory functions ⁴. One of the most prominent types of diabetic peripheral neuropathy is Peripheral Diabetic Neuropathy (PDN). PDN affects the outer nerves of the limbs.

It directly leads to changes in sensory function, abnormal feelings, and progressive numbness, and increases the risk of foot ulceration, amputation, cognitive dysfunction, and economic burden. The prevalence of PDN is found to be 50% among DM patients ⁵. The quality of life is badly affected by PDN, which has a considerable number of morbidities and mortalities ⁶⁻⁷. The prevalence of foot ulcers in patients affected by DM is nearly 25% ⁸⁻⁹. Different key factors, like different types of diagnostic methods, diabetes type, and collection of the sample, etc., contribute to the fluctuating prevalence (9.6 to 88.7%) of PDN in patients with DM ¹⁰⁻¹³. In serious cases, PDN can lead to cutting off the limbs of patients suffering from DM. The frequency of amputation is 10–20 times higher in diabetic patients affected by PDN than in non-diabetic patients. One study from Iran showed a prevalence of 53% in patients associated with PDN ¹⁴. According to published studies, the prevalence of peripheral neuropathy in Pakistani diabetes patients varies greatly, from 16.30% to 79.50% ¹⁵.

Eradicating PDN from the root is not possible, and it is more troublesome for patients who live in third-world countries where health care resources are scarce. As Body Mass Index (BMI) and age pass, diabetic patients become more vulnerable to PDN ¹⁶. Fatal outcomes of PDN can only be countered by counseling the patients to check their blood glucose levels regularly; suitable medical interventions could be started if any complications arise to avoid the risk of cutting off the limbs (lifetime disability) and worsening the quality of life of diabetic patients ¹⁷.

PDN can be very painful, and "traditional therapies" are typically useless. In such cases, treatment with "corticosteroids" for a few weeks or months, combined with glycemic control adjustment, is a good idea. It's vital to recall that focused "diabetic

neuropathies" have a usually good "spontaneous prognosis". However, little research has been done to assess if diabetes control has improved in our clinical context over time as knowledge of the disease pathophysiology has increased. As a result, the purpose of our study was to find out how common diabetic neuropathy is in Swabi, Khyber Pakhtunkhwa (KPK)¹⁸.

MATERIAL AND METHODS

This was a descriptive cross-sectional study, conducted from January 1 to June 30, 2023 in Bacha Khan Medical Complex Swabi, KPK. Total number of patients enrolled having DM were 246, among which 119 were males and 127 were females. Openepi sample calculator was used for calculating the sample size. The ethics committees of the Bacha Khan Medical Complex Swabi, approved the study. Following the approval of the study by the ethics committee, all patients provided both oral and written consent. Patients of both genders included in the study were adults ≥ 18 and had a history of diabetes for a minimum of 1 year. Pregnant women, patients affected by neuropathy associated with additional causes i.e., cerebral infarction, Guillain-Barre syndrome, lumbar/cervical degeneration, patients in which toxins were produced by metabolism results in damage to the nerve, patients which are mentally unstable and those who fail to cooperate were excluded from this study.

Diabetes Type 1 and Type 2 were diagnosed according to World Health Organization (WHO) criteria¹⁹. Nerve Control Studies were used for the diagnosis of Diabetic Peripheral Neuropathy in the patients. For the collection of patients' information, standardized questionnaires were designed to collect illnesses related information, demographic

data, and clinical observation. All of the data was **RESULTS**

collected and analysed using SPSS-20. The Chi-square test was used to compare categorical variables (age and gender) with PDN. Clinical significance was defined as a P-value of greater than 0.005. Tables were used to present the data that had been analysed.

Total Patients	Minimum Age	Maximum Age	Mean	Std. Deviation
246	18	75	46.43	16.133

There were 119 (48.4%) males and 127 (51.6%) females (Table 2). PDN showed a prevalence of 47.2%, 116 patients were diagnosed with PDN (Table 3).

Table 2: The table indicates frequency and percent of patient's gender

Gender	Frequency	Percent
Male	119	48.4
Female	127	51.6
Total	246	100.0

The results showed that 59 (50.9%) females had PDN and 57 (49.1%) males had DPN. Upon apply gender and PDN cross tabulation using Chi-Square test, we found non-significant association (Table 4).

TABLE 4: THE TABLE INDICATES GENDER AND PDN CROSS TABULATION USING CHI-SQUARE TEST

DPN	Patient Gender		Total	P= 0.821
	Male	Female		
Yes	57	59	116	
	49.1%	50.9%	100.0%	
No	62	68	130	
	47.7%	52.3%	100.0%	
Total	119	127	246	
	48.4%	51.6%	100.0%	

The maximum number of patients diagnosed with PDN were found in the age group of 41 to 65 which was 77 (66.41%). The cross tabulation of age groups and PDN using Chi Square test showed a statistical significance (Table 5).

Table 5: The table indicates age and PDN cross tabulation using Chi-Square test

Yes	Age Groups			P= 0.0001
	=<40	41 to 65	66 to 75	
	14	77	25	
No	12.1%	66.4%	21.6%	
	83	37	10	
	63.8%	28.5%	7.7%	
Total	97	114	35	
	39.4%	46.3%	14.2%	

DISCUSSION

Peripheral diabetic neuropathy (PDN) is a devastating complication of diabetes mellitus. In this study, we evaluated the prevalence of PDN in diabetic patients. We also determined the association of various patient related variables with PDN. In our study we have found prevalence of PDN to be 47.2 %. Various studies conducted in Pakistan have found the prevalence of PDN in diabetic patients from 39.6% to 74.8%²⁰⁻²². In Asian countries the prevalence of PDN found was 29.2% to 61%^{23,24}.

In our study, we have found a significant association of age with PDN in diabetic patients. It is in accordance with the study by Tesfaye *et al.* and Arifa *et al*^{25, 26}. The age group of 41 to 65 had the higher number of patients with PDN which was 77 (66.41%). Our results indicates increased percent then another study from Pakistan in which its percent in patient is 42.1% among age group of 41 to 50 years²⁷. This indicates that prolonged diabetes can lead to PDN in patients above 40 years of age.

Regarding to gender, our study showed a number of 119 (48.4%) males and 127 (51.6%) females. PDN was found slightly higher in female patients which was 59 (50.9%) as compared to males 57 (49.1%). Similar results regarding to higher number of PDN in females was also found in a study which showed 52.6% females and 47.4% males with PDN²⁸. Though there was found no significance association between gender and PDN which is in

accordance with the findings from different studies²⁹⁻³¹.

The limitations of this study are that this study do not looked into risk factors, duration of diabetes mellitus and socioeconomic status. Furthermore, the sample size was limited and the results were not compared between type I and II diabetes. This study, on the other hand, helps to determine the prevalence of diabetic neuropathy in our area. Patients were also separated into age and gender categories.

CONCLUSION

Diabetes and diabetic neuropathy are more frequent in women and the elderly, according to our data. It is found significant with the age while independent on gender. More study is required to better understand and uncover the connections between diabetes and neuropathy. More effective therapy techniques are needed for both neuropathic and non-neuropathic diabetes patients. PDN is one of the most hazardous complication of Diabetes Mellitus, health authorities need to divert their maximum potential towards awareness, diagnosis and treatment of DM in middle aged and elderly patients to avoid PDN from developing.

The limitations of this study are that this study do not looked into risk factors, duration of diabetes mellitus and socioeconomic status. Furthermore, the sample size was limited and the results were not compared between type I and II diabetes. This study, on the other hand, helps to determine the

prevalence of diabetic neuropathy in our area. Patients were also separated into age and gender categories.

REFERENCES

1. V. Hall, R. Thomsen, O. Henriksen, and N. Lohse, "Diabetes in Sub Saharan Africa 1999–2011: epidemiology and public health implications. A systematic review," *BMC Public Health*, vol. 11, article 564, no. 1, 2011.
2. International Diabetes Federation. IDF Diabetic Atlas 7th Edition. 166 Chaussee de La Hulpe, B-1170 Brussels, Belgium. [Last accessed on 2016 Sep 02]. <http://www.idf.org/idf-diabetes-atlas-seventh-edition>.
3. Malik SE, Kanwal S, Haider I, Javed J, Iqbal Y, Bibi S. Comprehension of Lifestyle Modification in Patient with Type 2 Diabetes Mellitus: A Kap Study. *J Gandhara Med Dent Sci*. 2024;11(1):712
4. A. J. Boulton, L. Vileikyte, G. Ragnarson-Tennvall, and J. Apelqvist, "The global burden of diabetic foot disease," *The Lancet*, vol. 366, no. 9498, pp. 1719–1724, 2005.
5. Abdollahi A. Neuropathy and retinopathy in diabetes: is there any association? *Int J Ophthalmol*. 2009;2:57–60.
6. Alleman CJ, Westerhout KY, Hensen M, et al. Human- istic and economic burden of painful diabetic peripheral neuropathy in Europe: a review of the literature. *Diabetes Res Clin Pract*. 2015;109:215–225.

7. Pop-Busui R, Evans GW, Gerstein HC, et al. Effects of cardiac autonomic dysfunction on mortality risk in the Action to Control Cardiovascular Risk in Diabetes (ACCORD) trial. *Diabetes Care*. 2010;33:1578–1584.
8. Z. Yang, R. Chen, Y. Zhang, Y. Huang, T. Hong et al., “Scoring system to screen for diabetic peripheral neuropathy,” *Cochrane Database of Systemic Reviews*, no. 3, Article ID CD010974, 2014.
9. A. J. Boulton, “The diabetic foot: a global view,” *Diabetes/Metabolism Research And Reviews*, vol. 16, Supplement 1, pp. S2–S5, 2000.
10. G. Jember, Y. A. Melsew, B. Fisseha, K. Sany, A. Y. Gelaw, and B. Janakiraman, “Peripheral Sensory Neuropathy and associated factors among adult diabetes mellitus patients in Bahr Dar, Ethiopia,” *Journal of Diabetes and Metabolic Disorders*, vol. 16, no. 1, 2017.
11. A. Y. Al Washali, A. A. Azuhairi, A. R. Hejar, and Y. W. Amani, “Prevalence and associated risk factors of diabetic peripheral neuropathy among diabetic patients in national center of diabetes in Yemen,” *International Journal of Public Health and Clinical Sciences*, vol. 1, no. 1, pp. 141–150, 2014.
12. T. Kisozi, E. Mutebi, M. Kisekka et al., “Prevalence, severity and factors associated with peripheral neuropathy among newly diagnosed diabetic patients attending mulago hospital: A crosssectional study,” *African Health Sciences*, vol. 17, no. 2, pp. 463–473, 2017.
13. A. Jacovides, M. Bogoshi, L. A. Distiller et al., “An epidemiological study to assess the prevalence of diabetic peripheral neuropathic pain among adults with diabetes attending private and institutional outpatient clinics in South Africa,” *Journal of International Medical Research*, vol. 42, no. 4, pp. 1018–1028, 2014.
14. S. Sobhani, H. Asayesh, F. Sharifi, et al., Prevalence of diabetic peripheral neuropathy in Iran: a systematic review and meta-analysis, *J Diabetes Metab. Disord. Control* 13 (2014) 97, <http://dx.doi.org/10.1186/s40200-014-0097-y>.
15. Akhtar S, Hassan F, Saqlain SR, Ali A, Hussain S. The prevalence of peripheral neuropathy among the patients with diabetes in Pakistan: a systematic review and meta-analysis. *Scientific Reports*. 2023. 13:11744.
16. Amour AA, Chamba N et al. Prevalence, patterns, and factors associated with peripheral neuropathies among diabetic patients at tertiary Hospital in the Kilimanjaro Region: descriptive cross-sectional study from north-eastern Tanzania. *International Journal of Endocrinology*. 2019 Jun 4;2019.
17. Khawaja N, Abu-Shennar J et al. The prevalence and risk factors of peripheral neuropathy among patients with type 2 diabetes mellitus; the case of Jordan. *Diabetology & metabolic syndrome*. 2018 Dec 1;10(1):8.
18. Lihaz Gul, Nadeem Sharif, Sajjad Mohammad, Badi Uddin, Zahid Khan, Abid Rahim. Prevalence of Diabetic Neuropathy in Diabetic Type II Patients from Khyber Pakhtunkhwa. 2022. *P J M H S*, Vol. 16, No. 01.
19. Pan Q, Li Q, Deng W, Zhao D, Qi L, Huang W, Ma L, Li H, Li Y, Lyu X, Wang A. Prevalence of and risk factors for peripheral neuropathy in Chinese patients with diabetes: a multicenter cross-sectional study. *Frontiers in endocrinology*. 2018
20. Nisar MU, Asad A, Waqas A, Ali N, Nisar A, Qayyum MA, et al. Association of Diabetic Neuropathy with Duration of Type 2 Diabetes and Glycemic Control. *Cureus*. 2015;7(8):e302-e.
21. Iftikhar M, Hussain A, Rizvi A. Frequency of peripheral neuropathy in patients with diabetes mellitus. *J Ayub Med Coll Abbottabad*. 2014;26(4):584-6.
22. Ahmed U. Prevalence of chronic complications and associated factors in type 2 diabetes. 2004.
23. Rai ON, Mishra V, Chandra R, Saxena S, Mangal B. Study of prevalence and risk factors of peripheral diabetic neuropathy in a tertiary hospital. *JEMDS*. 2016;5(13):557-9.

24. Bansal D, Gudala K, Muthyala H, Esam HP, Nayakallu R, Bhansali A. Prevalence and risk factors of development of peripheral diabetic neuropathy in type 2 diabetes mellitus in a tertiary care setting. *J Diabetes Investig.* 2014;5(6):714-21.
25. Tesfaye S. Recent advances in the management of diabetic symmetrical polyneuropathy. *J Diabetes Invest.* 2010;2: 3342.
26. Arifa Shamim, Arooj Haq, Maryam Ali. Prevalence of Peripheral diabetic Neuropathy and its Association with patients related factors. *P J M H S.* 2017. Vol. 11, NO. 3, 11-32.
27. Ali Lakhia M, Naeem Shahbaz N, Hafeez Bughio A, Prakash J. Frequency
28. Shamim AR, Haq AR, Ali MA. Prevalence of Peripheral diabetic Neuropathy and its Association with patients related factors. *Pak J Med Health Sci.* 2017 Jul 1; 11:1130-2.
29. Lihaz Gul, Nadeem Sharif, Sajjad Mohammad, Badi Uddin, Zahid Khan, Abid Rahim. Prevalence of Diabetic Neuropathy in Diabetic Type II Patients from Khyber Pakhtunkhwa. *P J M H S,* 2022. Vol. 16, No.01, 898-900.
30. Karki DB, Yadava SK, Pant S, Thusa N, Dangol E, Ghimire S. Prevalence of Sensory Neuropathy in Type 2 Diabetes Mellitus and Its Correlation with Duration of Disease. *Kathmandu Univ Med J.* 2016;54(2):120-4
31. Cabezas-Cerrato J. The prevalence of clinical diabetic polyneuropathy in Spain: A study in primary care and hospital clinic groups: Neuropathy Spanish Study Group of the Spanish Diabetes Society (SDS) *Diabetologia.* 1998; 41:1263-9.

CONFLICT OF INTEREST

None Declared

GRANT SUPPORT AND FINANCIAL DISCLOSURE

NIL

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.