Journal of Advanced Medical and Dental Sciences Research

@Society of Scientific Research and Studies ***NLM ID:*** *101716117*

Journal home page: www.jamdsr.com doi: 10.21276/jamdsr Index Copernicus value = 85.10

(e) ISSN Online: 2321-9599; (p) ISSN Print: 2348-6805

Original Research

Prevalence and associated factors of diabetic peripheral neuropathy in type 2 diabetic patients: An observational study from a tertiary care hospital in central India

[1]Dr. Adarsh Bajpai, [2]Dr. Ashutosh Kumar, [3]Dr. Jai Kumar Gavli, [4]Dr. Ishan Verma, [5]Dr. Devendra P.S. Rajput

[1,4]Assistant Professor, [2,3]Associate Professor, [5]Professor

Department of General Medicine, L.N. Medical College & Research centre, Bhopal, M.P, India

ABSTRACT:

Background: Diabetic peripheral neuropathy [DPN] is one of the most common complications of diabetes mellitus [DM] and is a significant risk factor for diabetic foot ulcers and lower limb amputation. **Materials and Methods:** Observational study carried on type 2 diabetes patients attending outdoor of Department of Medicine at L N Medical college and Research Centre, Bhopal. A total of 100 eligible diabetic patients were enrolled. Complete demographic and clinical details of all the patients were obtained. A case record form of each patient was filled, which contained the patient's detailed diabetes profile, including their age, sex, duration of diabetes, their smoking habits, dietary habits, medical history, laboratory parameters, and treatment is taken. Each patient was assessed for peripheral neuropathy using Michigan Neuropathy Screening Instrument [MNSI]. **Results:** The prevalence of diabetic peripheral neuropathy was found to be 45% among type 2 DM patient Male gender, age ≥55 years, duration of diabetes >10 years, obesity, smoking, hypertension, dyslipidemia, poor glycemic control was found to be significantly associated with diabetic peripheral neuropathy. **Conclusions:** The high prevalence of DPN among diabetic outdoor patients suggests essential screening of all DM patients by their primary physician to detect DPN and timely intervention.

Keywords: Diabetic peripheral neuropathy, Type 2 DM, Central India.

Received: 10 June, 2021 Accepted: 26 July, 2021

Corresponding author: Dr. Adarsh Bajpai, Assistant Professor, Department of General Medicine, L.N. Medical College & Research Centre, Bhopal, Madhya Pradesh, India

This article may be cited as: Bajpai A, Kumar A, Gavli JK, Verma I, Rajput DPS. Prevalence and associated factors of diabetic peripheral neuropathy in type 2 diabetic patients: An observational study from a tertiary care hospital in central India. J Adv Med Dent Scie Res 2021;9(8):6-9.

INTRODUCTION

Diabetes is a significant health problem globally, and its prevalence was estimated to be 9.3% (463million people) in 2019 and rising to 10.9% (700 million) by 2045.[1]Diabetes complications negatively affect the quality of life and impart a huge economic burden.[2]

Diabetes-related complications are classified classically as Microvascular and Macrovascular Complications. These complications are, directly or indirectly, a consequence of chronic hyperglycemia. Microvascular complications are neuropathy, nephropathy, and retinopathy, and most diabetic patients will have one or more of these, clinically apparent or subtle, during their lifetime.UK Prospective Diabetes Study (UKPDS) and Diabetes Control of Complications Trial (DCCT) have demonstrated a relationship between microvascular disease and glucose control.[3,4]

The microvascular disease develops due to a combination of oxidative stress due to overproduction of superoxide, direct glucose-mediated endothelial damage, and the production of sorbitol and advanced glycation end-products; these metabolic injuries ultimately result in organ dysfunction.[5,6]

Out of various types of diabetic neuropathy, the most common form is distal, symmetrical sensorimotor neuropathy, and in up to 50% of cases, it may be asymptomatic. Usually, neuropathies are persistent, rarely reversible.[6,7]

During their lifetime, nearly 50% of diabetic adults will eventually be affected by DPN.[8]DPN is one of the major etiological factors causing foot ulcers,

which, along with other factors, dramatically increases the risk of lower limb amputation. The lifetime incidence of developing a foot ulcer in a diabetic patient can be as high as 25%.[9]DM is a leading cause of lower limb amputation.[10]

In India, approximately 45000 lower limbs are amputated every year and most of which is preventable.[11]So early identification of diabetic peripheral neuropathy, its associated risk factors, patient education about foot care and hygiene, dietary and lifestyle modifications, and regular follow-up can significantly reduce the risk of complications and improve quality of life.

MATERIALS AND METHODS

The present study was planned for assessing the prevalence of peripheral neuropathy and associated factors in type 2 diabetic patients. An institution-based observational study was conducted on 100 eligible type 2 diabetic patients attending outdoor of Department of Medicine at L N Medical college and Research Centre, Bhopal, from 1 March to 30 May 2021.

INCLUSION CRITERIA

- ✓ Diagnosed case of type 2 DM.

EXCLUSION CRITERIA

- × Obvious cause of peripheral neuropathy other than diabetes, bilateral lower limb amputees.
- × Patients who refuse to participate.

A case record form of each patient was filled, which contained the patient's detailed diabetes profile, including their age, sex, duration of diabetes, their habits, smoking, dietary habits, medical history, laboratory parameters, and treatment is taken. Each patient was assessed for peripheral neuropathy using Michigan Neuropathy Screening Instrument [MNSI], a validated and simple screening tool for DPN and can be used easily outdoor.[12]

Chi-square test was applied to find the association. P-Value of less than 0.05 was taken as significant.

RESULTS

The study included a total of 100 type 2 Diabetic patients aged 35 to 80 years with a mean age of 55.3 years; 62% were males and 32% females, with a mean BMI of 32.2 kg/m2. The mean duration of diabetes was 9.12 years, nearly half of the participants had diabetes for > 10 years, and only 39 % had controlled diabetes. The majority (56%) of the study subjects had dyslipidemia, and (67.0%) had hypertension.

The overall prevalence of DPN among study participants was 45% (based on MNSI score), amongst them 34% in males and 11% in females, higher in males compared to females.

The participants with age ≥55 years had more DPN than with <55 years, with respect to BMI, the overweight and obese were having more DPN than normal BMI. Similarly, participants withHbA1c ≥7 % had more DPN than those with HbA1c levels < 7%. Participants with a duration of diabetes>10 years had more DPN than with <10 years. Those with hypertension, Dyslipidemiahad more DPN than those without it. Smokers had more DPN than non-smokers.

Table No: - 1 Sociodemographic, clinical and laboratory characteristics of the study participants and their association with the presence of DPN (N=100)

Variables		DPN Present (n = 45)	DPN Absent (n = 55)	Total (N=100)	Chi-square, p value (X^2)
Sex	Male	34	28	62	6.38, p = 0.011
	Female	11	27	38	
Duration	≤10 years	18	35	53	5.5, p =0.018
	>10 years	27	20	47	
HbA1c	<7%	4	35	39	31.18, p<.00001
	≥7%	41	20	61	
BMI	Normal	5	25	30	13.90, p=0.0001
	Obese	40	30	70	
Age	<55	17	35	52	6.63, p=0.017
	≥55	28	20	48	
Smoking	Yes	25	15	40	8.2, p=0.004
	No	20	40	60	
Hypertension	Yes	37	30	67	8.57, p=0.003
	No	8	25	33	
Dyslipidemia	Present	32	24	56	7.58, p=0.005
	Absent	13	31	44	

Chi-square test was applied to find the association. P-Value of less than 0.05 was taken as significant.

DISCUSSION

In this study prevalence of diabetic peripheral neuropathy came out to be 45% and this is similar to findings of other studies in India and abroad[13-19].Prevalence of DPN in our study is higher compared to the other studies of India by Shera ASet al[20] and Gill H K[21]in which it was19.1% and 29.2 respectively. The prevalence of DPN found in our study is lower than that conducted by Yang Q et al[22] and Qin L et al [23]in which it was close to 71% and 80%, respectively.

These differences could be due to differences in the population studied, duration of diabetes or the severity of hyperglycemia in different studies, or the screening tool used for DPN diagnosis.

In this study, the prevalence of DPN was higher in males compared to females, and this is similar to some other studies[24, 25]and the most likely reason behind this could be that females have poor access to the health care system and they also have poor health-seeking behavior, and as a consequence, they have a lesser chance of being detected for DPN.

In the present study, we found the prevalence of DPN is higher among patients aged ≥55 years and is similar to the published literature[26, 27, 28]. As the life expectancy is increasing, the proportion of old aged persons in the population is also increasing, as a result of which, the prevalence and duration of diabetes and its complications is increasing, so appropriate measures should be taken at the community level for early diagnosis and timely management of DM and its associated complications to decrease the morbidity and mortality and impaired quality of life associated with it.

In our study, we found an association of various factors with diabetic peripheral neuropathy like Male gender, advancing age, long duration of DM, poor glycemic control, dyslipidemia, obesity, smoking, and hypertension and is similar to other studies in India[18,19].

CONCLUSION

The prevalence of diabetic peripheral neuropathy is high in patients with type 2 diabetes, and various factors are associated with it like smoking, hypertension, dyslipidemia, obesity, which are increasing day by day in our community. So, there should be mandatory screening facilities to be available at each health care level to identify early, timely treatment, and educate the patients of diabetic peripheral neuropathy to improve quality of life and decreasing financial burden to society.

REFERENCES

1. Saeedi P, Petersohn I, Salpea P, et al. Global and regional diabetes prevalence estimates for 2019 and projections for 2030 and 2045: Results from the International Diabetes Federation Diabetes Atlas, 9th edition. Diabetes Res ClinPract. 2019;157:107843. doi:10.1016/j.diabres.2019.107843.
2. Prompers L, Huijberts M, Schaper N, et al. Resource utilisation and costs associated with the treatment of diabetic foot ulcers. Prospective data from the Eurodiale Study. Diabetologia. 2008;51:1826–1834. doi: 10.1007/s00125-008-1089-6.
3. Intensive blood-glucose control with sulphonylureas or insulin compared with conventional treatment and risk of complications in patients with type 2 diabetes (UKPDS 33). UK Prospective Diabetes Study. UKPDS Group. Lancet 1998;352:837–53.
4. The effect of intensive treatment of diabetes on the development and progression of long-term complications in insulindependent diabetes mellitus. The Diabetes Control and Complications Trial Research Group. N Engl J Med 1993;329:977–86.
5. Goh K, Tooke J. Abnormalities of the microvasculature. In: Wass J, Shalet S, Oxford textbook of endocrinology and diabetes. Oxford: Oxford University Press, 2002:1749–55.10.1001/archneur.65.6.812.
6. Vithian K, Hurel S. Microvascular complications: pathophysiology and management. Clin Med (Lond). 2010;10(5):505-509. doi:10.7861/clinmedicine.10-5-505.
7. Boulton AJ, Vinik AI, Arezzo JC, et al. Diabetic neuropathies: a statement by the American Diabetes Association. Diabetes Care 2005;28:956–62.10.2337/diacare.28.4.956.
8. Hicks CW, Selvin E. Epidemiology of Peripheral Neuropathy and Lower Extremity Disease in Diabetes. CurrDiab Rep. 2019;19(10):86. Published 2019 Aug 27. doi:10.1007/s11892-019-1212-8.
9. Singh N, Armstrong DG, Lipsky BA. Preventing foot ulcers in patients with diabetes. JAMA. 2005;293(2):217–228.10.1001/jama.293.2.217.
10. Margolis DJ, Jeffcoate W. Epidemiology of foot ulceration and amputation: can global variation be explained? Med Clin North Am. 2013;97(5):791–805.10.1016/j.mcna.2013.03.008.
11. Jain AKC, Vishwanath S. Studying major amputations in a developing country using Amit Jain's typing and scoring system for diabetic foot complications - time for standardization of diabetic foot practice. IntSurg J. 2015;2(1):26-30. doi: 10.5455/2349-2902.isj20150205.
12. Moghtaderi A, Bakhshipour A, Rashidi H. Validation of Michigan neuropathy screening instrument for diabetic peripheral neuropathy. ClinNeurolNeurosurg. 2006;108(5):477-81. doi: 10.1016/j.clineuro.2005.08.003.
13. George H, Rakesh P, Krishna M, Alex R, Abraham VJ, George K, Prasad JH. Foot care knowledge and practices and the prevalence of peripheral neuropathy among people with diabetes attending a secondary care rural hospital in southern India.J Family Med Prim Care. 2013;2(1):27-32. doi: 10.4103/2249-4863.109938.
14. Sun J, Wang Y, Zhang X, Zhu S, He H. Prevalence of peripheral neuropathy in patients with diabetes: A systematic review and meta-analysis. Prim Care Diabetes. 2020;14(5):435-44. doi: 10.1016/j.pcd.2019.12.005.
15. Sendi RA, MahrusAM, Saeed RM, Mohammed MA, Al-Dubai SAR. Diabetic peripheral neuropathy among Saudi diabetic patients: A multicenter cross-sectional study at primary health care setting. J Family Med Prim Care. 2020;9(1):197-201. doi: 10.4103/jfmpc.jfmpc_927_19.

16. Braffett BH, Gubitosi-Klug RA, Albers JW, Feldman EL, Martin CL, White NH, et al. 2020;69(5):1000-10. doi: 10.2337/db19-1046.
17. Shiferaw WS, Akalu TY, Work Y, Aynalem YA. Prevalence of diabetic peripheral neuropathy in Africa: a systematic review and meta-analysis. BMC EndocrDisord. 2020;20(1):49. doi: 10.1186/s12902-020-0534-5.
18. Darivemula S, Nagoor K, Patan SK, Reddy NB, Deepthi CS, Chittooru CS. Prevalence and Its Associated Determinants of Diabetic Peripheral Neuropathy (DPN) in Individuals Having Type-2 Diabetes Mellitus in Rural South India. Indian J Community Med. 2019;44(2):88-91. doi:10.4103/ijcm.IJCM_207_18.
19. Bashar MDA, Verma M. Prevalence and Determinants of Diabetic Peripheral Neuropathy/Foot Syndrome in the Rural Population of North India. Iberoam J Med. 2021;3(1):18-25. doi: 10.5281/zenodo.4393501.
20. Shera AS, Jawad F, Maqsood A, Jamal S, Azfar M, Ahmed U, et al. Prevalence of chronic complications and associated factors in type 2 diabetes. J Pak Med Assoc. 2004;54:54–9.
21. Gill HK, Yadav SB, Ramesh V, Bhatia E. A prospective study of prevalence and association of peripheral neuropathy in Indian patients with newly diagnosed type 2 diabetes mellitus. J Postgrad Med. 2014;60:270–5.
22. Yang Q, Zhang Y, Zeng Q, Yang C, Shi J, Zhang C, et al. Correlation Between Diabetic Peripheral Neuropathy and Sarcopenia in Patients with Type 2 Diabetes Mellitus and Diabetic Foot Disease: A Cross-Sectional Study. Diabetes MetabSyndrObes. 2020;13:377-86. doi: 10.2147/DMSO.S237362.
23. Qin L, Niu JY, Zhou JY, Zhang QJ, Zhou F, Zhang N, et al. [Prevalence and risk factors of diabetic peripheral neuropathy in Chinese communities]. Zhonghua Liu Xing Bing XueZaZhi. 2019;40(12):1578-84. doi: 10.3760/cma.j.issn.0254-6450.2019.12.014.
24. Braffett BH, Gubitosi-Klug RA, Albers JW, Feldman EL, Martin CL, White NH, et al. 2020;69(5):1000-10. doi: 10.2337/db19-1046.
25. Perrin BM, Allen P, Gardner MJ, Chappell A, Phillips B, Massey C, et al. The foot-health of people with diabetes in regional and rural Australia: baseline results from an observational cohort study. J Foot Ankle Res. 2019;12:56. doi: 10.1186/s13047-019-0366-6.
26. Sendi RA, MahrusAM, Saeed RM, Mohammed MA, Al-Dubai SAR. Diabetic peripheral neuropathy among Saudi diabetic patients: A multicenter cross-sectional study at primary health care setting. J Family Med Prim Care. 2020;9(1):197-201. doi: 10.4103/jfmpc.jfmpc_927_19.
27. Qin L, Niu JY, Zhou JY, Zhang QJ, Zhou F, Zhang N, et al. [Prevalence and risk factors of diabetic peripheral neuropathy in Chinese communities]. Zhonghua Liu Xing Bing XueZaZhi. 2019;40(12):1578-84. doi: 10.3760/cma.j.issn.0254-6450.2019.12.014.
28. Popescu S, Timar B, Baderca F, et al. Age as an independent factor for the development of neuropathy in diabetic patients. ClinInterv Aging. 2016;11:313-318. Published 2016 Mar 15. doi:10.2147/CIA.S97295.