

Original Research

Diabetic peripheral neuropathy in patients with type II diabetes mellitus

Purushottam Singh Yadav

Assistant professor, Department of General Medicine, Prasad Institute of Medical Sciences Lucknow, U.P., India

ABSTRACT

Background: Type 2 DM is characterized by insulin resistance, with or without insulin deficiency that induces organ dysfunction. The present study was conducted to assess cases of diabetic neuropathy. **Materials & Methods:** 180 type II diabetes patients of both genders underwent assessment of fasting blood sugar, random blood sugar and glycosylated hemoglobin was done. Physical signs such as numbness, ulcerations loss of reflexes were recorded. Assessment of diabetic polyneuropathy was done. **Results:** Out of 180 patients, males were 100 and females were 80. Out of 180 patients, 82 (45.5%) had diabetic peripheral neuropathy. There were 4 cases of DPN with 10 years, 20 cases with 5-10 years and 52 cases with >10 years of diabetes history. 60 had numbness of limbs and 34 had ulceration. The difference was significant ($P < 0.05$). **Conclusion:** There was high prevalence of diabetic peripheral neuropathy among type II diabetics.

Key words: Diabetes, diabetic peripheral neuropathy, glycosylated hemoglobin

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Corresponding author : Dr. Purushottam Singh Yadav, Assistant professor, Department of General Medicine, Prasad Institute of Medical Sciences Lucknow, U.P., India

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INTRODUCTION

Diabetes mellitus (DM) is a devastating metabolic disorder that places an economic burden for every country around the world with the global increasing trend. Type 2 DM is characterized by insulin resistance, with or without insulin deficiency that induces organ dysfunction.¹ Persistent hyperglycemia in DM generates reactive oxygen species (ROS) and nitrosative species (RNS); both are considered an essential factor for DM macro- and microvessels complications. Along with overproduction of ROS and RNS, a reduction of the activity of antioxidant enzymes is known to cause endothelial dysfunction, insulin resistance, and DM complications.² Furthermore, oxidative stress inhibits insulin secretion in pancreatic β -cells by activation of uncoupling protein 2 (UCP-2), which, in turn, reduces the adenosine triphosphate (ATP)/adenosine diphosphate (ADP) ratio, and thus reduces the insulin secretory response. This approach explains the pancreatic

dysfunction induced by glucose toxicity, as part of the pathophysiology of DM.³

DPN is a leading cause of worldwide disability, and it affects the quality of life due to chronic pain, high risk of falls, foot ulceration and limb amputation. Furthermore, DPN symptoms often lead to sleep disorders, anxiety, and depression. The poor glycemic control causing hyperglycemia and microangiopathy is the common underlying pathophysiology.⁴ However, other factors are involved in the neuropathy progression, such as modifiable cardiovascular risk factors, including dyslipidemia, smoking, and hypertension; consequently, public health strategies could be implemented to reduce the disease frequency. Despite DPN's importance, effective screening methods are lacking, which results in a diagnostic delay of DPN, hence producing heterogeneous epidemiological estimates between regions.⁵ The present study was conducted to assess cases of diabetic neuropathy.

MATERIALS & METHODS

The present study was conducted among 180 type II diabetes patients of both genders. All were informed regarding the study and written consent was obtained. Data such as name, age, gender etc. was recorded. Assessment of fasting blood sugar, random blood sugar and glycosylated hemoglobin was done.

Physical signs such as numbness, ulcerations loss of reflexes were recorded. Assessment of diabetic polyneuropathy was done. Results were tabulated and subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Total - 180		
Gender	Male	Female
Number	100	80

Table I shows that out of 180 patients, males were 100 and females were 80.

Table II Diabetic peripheral neuropathy in diabetes patients

Total	Number	Percentage
180	82	45.5%

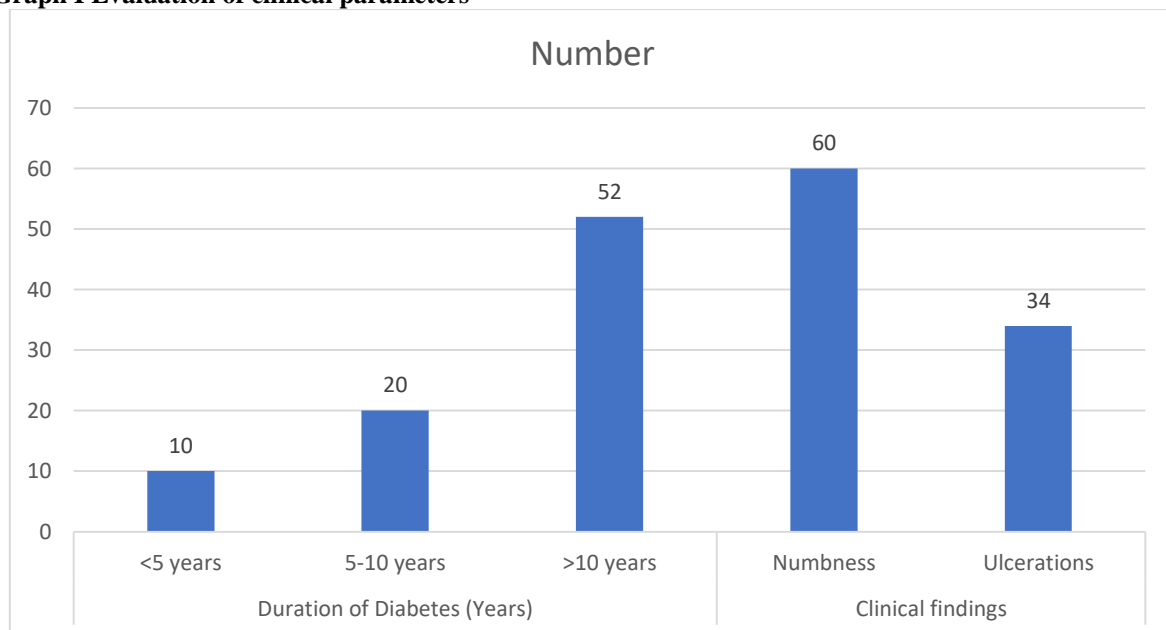
Table II, shows that out of 180 patients, 82 (45.5%) had diabetic peripheral neuropathy.

Table III Evaluation of clinical parameters

Parameters	Variables	Number	P value
Duration of Diabetes (Years)	5	10	0.01
	5-10	20	
	>10	52	
Clinical findings	Numbness	60	0.05
	Ulcerations	34	

Table III, graph I shows that there were 4 cases of DPN with 10 years, 20 cases with 5-10 years and 52 cases with >10 years of diabetes history. 60 had numbness of limbs and 34 had ulceration. The difference was significant (P<0.05).

Graph I Evaluation of clinical parameters



DISCUSSION

Diabetes mellitus (DM) is an important global health issue. Around 425 million people worldwide are suffering from this disease, and this number is expected to rise to 628 million people by 2045. Diabetic peripheral neuropathy (DPN) is the most prevalent complication of diabetes mellitus.⁶ The prevalence of DPN ranges from 21.3 to 34.5% in type 2 DM (T2DM) and between seven to 34.2% in type 1 DM (T1DM). Of these, up to 45% of patients with type 2 DM and 54% with type 1 DM could be asymptomatic. DPN refers to disorders affecting the peripheral nervous system.⁷ The most common presentation is distal symmetric polyneuropathy, typically associated with numbness, tingling, pain or weakness that begins in the feet and spread proximally in a stocking distribution.⁸ The present study was conducted to assess cases of diabetic neuropathy.

We found that out of 180 patients, males were 100 and females were 80. Maheshwari et al⁹ assessed complications in type II diabetes mellitus patients. This study was conducted on 328 type II DM patients of both genders. A thorough clinical examination was performed in all subjects. All were subjected to fasting and random blood glucose level. Glycosylated hemoglobin level was also assessed. Complications of diabetes were recorded. Out of 328 diabetic patients, males were 210 and females were 118. Age group 45 years had 95 males and 60 females. The difference was statistical significant. 218 patients were vegetarian, 110 were non-vegetarian, 156 patients were smokers and 148 were alcoholic. 190 patients were obese. Common complications were hypertension in 215, visual disturbance in 65, neuropathy in 56, foot ulceration in 34, nephropathy in 58, impotency in 14, and diabetic retinopathy in 75. We found that out of 180 patients, 82 (45.5%) had diabetic peripheral neuropathy. Callaghan et al¹⁰ conducted a study and found that the mean age was 57.2 yrs. A total of 238 (72%) had type 2 and 89 (27.2%) had type 1 DM. The prevalence of peripheral neuropathy was 72.2% of whom 55% were severe, 19% were moderate, and 26% were mild. The severity of neuropathy increased with the increase in age >40 years and increase in body mass index ($p < 0.001$) and duration of diabetes; duration >7 years. The main associated factors were age >40 years, OR 2.8, >60 years, OR 6.4, obesity, OR 6.7, and hypertension.

We observed that there were 4 cases of DPN with 10 years, 20 cases with 5-10 years and 52 cases with >10 years of diabetes history. 60 had numbness of limbs and 34 had ulceration. Younger et al¹¹ found that the severity of neuropathy was mild in 17%, moderate in 50%, and severe in 33%. Two-thirds of nerves were deemed primary axonopathy, and one-third primary myelinopathy. Altogether, 3% and 23% of nerves, respectively, revealed MV and PV. Immunofluorescence showed C3 and C5b-9 membrane attack complex deposits in the walls of

endoneurial microvessels in two-thirds of nerves. Necrotizing arteritis, detected in nerve biopsy tissue of two patients with DSPN and one DLRPN, was absent in postmortem tissue of the latter case in which femoral, sciatic nerve, and lumbar plexus showed PV of the epineurium, perineurium, and endoneurium.

Mishra et al¹² assessed the incidence of peripheral diabetic neuropathy in diabetic patients. A total of 100 diabetic patients were enrolled in the present study. A case record form of each patient was filled which contained the patients detailed diabetes profile including their age, sex, duration of diabetes, their personal habits smoking, dietary habits, medical history and treatment taken. Any patient with peripheral neuropathy was counselled regarding foot care. Also, based on the results of laboratory investigations and clinical examination of the patient, management was initiated as per institutional guidelines and that of the concerned treating medicine unit. Diabetic neuropathy was present in 25 percent of the patients. Mean age of the patients with and without diabetic neuropathy was 46.6 years and 59.4 years respectively. Mean duration of diabetes among patients with and without diabetic neuropathy was 5.6 years and 10.9 years respectively. Mean HbA1c concentration among patients with and without diabetic neuropathy was 8.2% and 10.4% respectively. Age, duration of diabetes, and poor glycemic control were considered to be the risk factors for neuropathy.

CONCLUSION

Authors found that there was high prevalence of diabetic peripheral neuropathy among type II diabetics.

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