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ORIGINAL RESEARCH

Diabetic peripheral neuropathy in patients with type II diabetes mellitus

[1]Dr. Jagdish Lal Wadhwani, [2]Dr. Anil Sejwar, [3]Dr. Aman Pandey

[1]Associate Professor, [2]Assistant Professor, [3]RMO-III Year, Department of General Medicine, Gandhi Medical College, Bhopal, Madhya Pradesh, India

Corresponding author
Dr. Anil Sejwar
Assistant Professor, Department of General Medicine, Gandhi Medical College, Bhopal, Madhya Pradesh, India
Email: Sejwaranil@yahoo.com

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Abstract

Background: Diabetes mellitus (DM) is a devastating metabolic disorder that places an economic burden for every country around the world with the global increasing trend.The present study was conducted to assess cases of diabetic peripheral neuropathy.

Materials & Methods: 150 type II diabetes patients of both genders were enrolled. All patients underwent a thorough clinical examination. Assessment of fasting blood sugar, random blood sugar and glycosylated hemoglobin was done. Physical signs such as numbness, ulcerations loss of reflexes was recorded. Assessment of diabetic polyneuropathy was done.

Results: Out of 180 patients, males were 70 and females were 110. Out of 70 male patients, 45 (64.2%) had diabetic peripheral neuropathy and out of 110 females, 58 (52.2%) had diabetic peripheral neuropathy. There were 58 cases of DPN with 10 years, 30 cases with 5-10 years and 25 cases with >10 years of diabetes history. Clinical findings were numbness of limbs in 65 and ulcerations in 38 cases. The difference was significant (P<0.05).

Conclusion: Results showed that male had high prevalence of diabetic peripheral neuropathyas compared to females. Risk factors were duration of diabetes.

Key words: Diabetes, diabetic peripheral neuropathy, fasting blood sugar

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. Furthermore, Diabetes mellitus (DM) is an important global health issue. 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.[2]

It is evident that 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 insulinsecretory response.

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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]The present study was conducted to assess cases of diabetic peripheral neuropathy in adult patients.

Materials & Methods

The present study comprised of 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. A thorough clinical examination was carried out followed by estimation of fasting blood sugar, random blood sugar and glycosylated hemoglobin. Physical signs such as numbness, ulcerations loss of reflexes was 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	70	110

Table I shows that out of 180 patients, males were 70 and females were 110.

Table II Prevalence of diabetic peripheral neuropathy

Total	Male	Female
180	45 (64.2%)	58 (52.2%)

Table II shows that out of 70 male patients, 45 (64.2%) had diabetic peripheral neuropathy and out of 110 females, 58 (52.2%) had diabetic peripheral neuropathy.

Table III Assessment of parameters

Parameters	Variables	Number	P value
Duration of Diabetes (Years)	5	25	0.05
	5-10	30	
	>10	58	
Symptoms	Numbness	65	0.02
	Ulcerations	38	

Table III, graph I shows that there were 58 cases of DPN with 10 years, 30 cases with 5-10 years and 25 cases with >10 years of diabetes history. Clinical findings werenumbness of limbs in 65 and ulcerations in 38 cases. The difference was significant (P<0.05).

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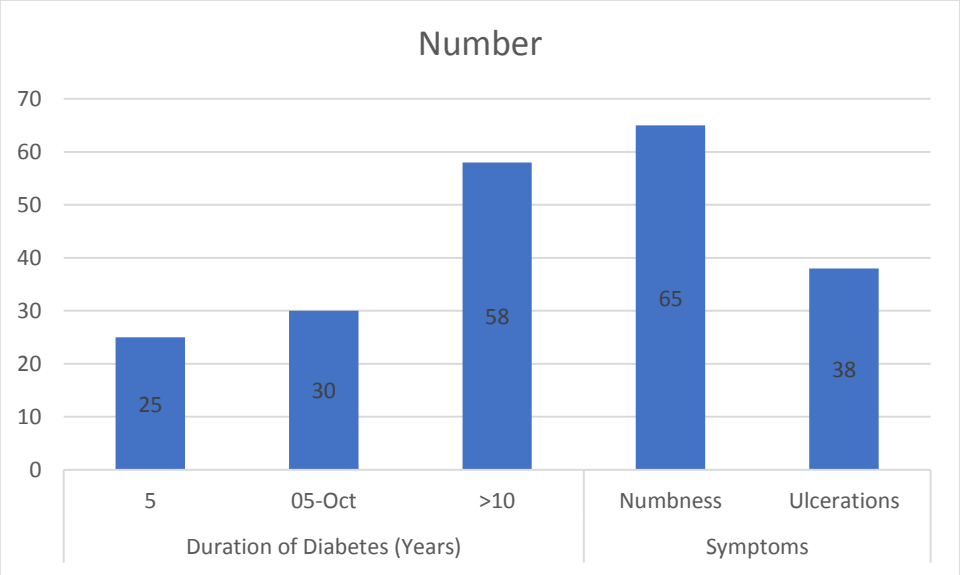
Graph I Assessment of parameters



Discussion

Diabetes mellitus (DM) has reached epidemic proportions worldwide. Historically, diabetes was considered a disease confined to developed countries and affluent people. However, recent estimates suggest that the prevalence of diabetes is rising globally, particularly in developing countries. Diabetes mellitus has become an important health concern in the South Asian region with an estimated increase in the prevalence of diabetes of over 151% between 2000 and 2030.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 association of elevated fasting triglycerides with DPN supports the emerging idea that hyper-triglyceridaemia contributes to the development and the progression of diabetic neuropathy. Elevated serum triglycerides are commonly associated with insulin resistance and represent a valuable clinical marker of the metabolic syndrome and the resultant atherogenic potential could contribute towards the progression of DPN. Increasing age, longer duration of diabetes and poor glycaemic control are well recognized risk factors for DPN, while cigarette smoking, retinopathy, hypertension, obesity, hyperlipidaemia and microalbuminuria have also been implicated as potential risk markers.[6] Most prevalence and risk factor studies are from western developed countries, while there is a relative scarcity of data from developing countries, particularly from the South-Asian region. However, an estimated 80% of the global population with diabetes lives in developing countries.[7,8]The present study was conducted to assess cases of diabetic peripheral neuropathy.

We found that out of 180 patients, males were 70 and females were 110.Katulanda et al[9] included 528 diabetic patients with a mean age of 55.0 ± 12.4 years and 37.3% were males, while 18% were from urban areas. Prevalence of DPN according to DNS score among all patients, patients with already established diabetes and newly diagnosed patients were 48.1%, 59.1% and 28.8% respectively. Prevalence of DPN in those with established DM as assessed by TCSS was 24% and the majority had mild DPN (16.6%). The remainder of the abstract is based on subjects with established DM. The prevalence of DPN in males and female was 20.0% and 26.4% respectively. The mean age of those with and without DPN was 62.1 ± 10.8 and 55.1 ± 10.8 years respectively ($p < 0.001$). The presence of foot ulcers, female gender and smoking were the strongest predictors followed by insulin treatment, diabetic

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retinopathy, treatment with sulphonylureas, increasing height, rural residence, higher levels of triglycerides and longer duration of DM.

We observed that out of 70 male patients, 45 (64.2%) had diabetic peripheral neuropathy and out of 110 females, 58 (52.2%) had diabetic peripheral neuropathy. Younger et al[10] 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.Previous studies have reported that metabolic control of DM was worse in patients with a lower socio-economic status. In addition, the increased risk in rural sector residents could be due to lack of access to the better health care facilities available to residents in urban areas.The association of increased height with DPN indicates that increased stature has a generalized adverse effect on peripheral nerve function. The increased nerve length in taller people is associated with greater axon surface area. Therefore, persons with longer nerves (and thus a larger total axon surface area) may be at greater risk for neurologic impairment when exposed to otherwise equivalent hazards.[11,12]

Conclusion

Authors found that results showed that male had high prevalence of diabetic peripheral neuropathy as compared to females. Risk factors were duration of diabetes.

References

1. Mulder G, Tallis A, Marshall V. Treatment of non-healing diabetic foot ulcers with a platelet-derived growth factor gene-activated matrix (GAM501): results of a phase 1/2 trial. Wound Repair Regen. 2009; 17:772-9.
2. Ajlouni K, Khader YS, Batieha A, Ajlouni H, El-Khateeb M. An increase in prevalence of diabetes mellitus in Jordan over 10 years. J Diabetes Complicat2008; 22:317–24.
3. Khader Y, Batieha A, Ajlouni H, El-Khateeb M, Ajlouni K. Obesity in Jordan: prevalence, associated factors, comorbidities, and change in prevalence over ten years. Metab Syndr Relat Disord. 2008;6(2):113–20.
4. Colagiuri S, Borch-Johnsen K, Glumer C. There really is an epidemic of Type 2 Diabetes. Diabetologia 2005; 48: 1459- 1463.
5. R.M. Anderson, M. B. Donnelly, R. F. Dedrick. Measuring the attitudes of patients towards diabetes and its treatment. Patient Education and Counseling. 1990; 2-12.
6. Knowler WC, Bennett PH, Hamman RF, Miller M. Diabetes incidence and prevalence in Pima Indians: a 19-fold greater incidence than in Rochester, Minnesota. Am J Epidemiol. 1978 Dec; 108:497–505
7. Boulton AJ, Gries FA, Jervell JA. Guidelines for the diagnosis and outpatient management of diabetic peripheral neuropathy. Diabet Med 1998;15:508–514.
8. Papanas N, Ziegler D. Prediabetic neuropathy: does it exist? Curr Diabetes Rep. 2012; 12:376–83.
9. Katulanda P, Ranasinghe P, Jayawardena R, Constantine GR, Sheriff MH, Matthews DR. The prevalence, patterns and predictors of diabetic peripheral neuropathy in a developing country. Diabetology & metabolic syndrome. 2012 Dec; 4(1):1-8.
10. Younger DS. Diabetic neuropathy: a clinical and neuropathological study of 107 patients. Neurology research international. 2010 Oct; 2010.

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11. Callaghan BC, Cheng HT, Stables CL, Andrea L, Smith AL, Feldman EL. Diabetic neuropathy: clinical manifestations and current treatments. Lancet Neurol. 2012; 11:521–34.
12. Weng C, Coppini DV, Sonksen PH: Geographic and social factors are related to increased morbidity and mortality rates in diabetic patients. Diabet Med 2000, 17(8):612–617.