

Original Research Article

Prevalence of peripheral neuropathy in newly diagnosed type 2 diabetics in sub-district hospital Bishnah

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ABSTRACT

Background: Diabetic neuropathy is a loss of sensory function beginning distally in the lower extremities that is also characterized by pain and substantial morbidity. Screening and early identification of neuropathy among diabetics can be a crucial opportunity for course modulation for keeping the glycemic control to optimal levels and within recommended targets.

Methods: A cross sectional observational study were conducted on 100 patients older than 30 years, of newly diagnosed type 2 diabetes mellitus (T2DM) and attending medicine OPD of sub district hospital Bishnah, district Jammu, Jammu and Kashmir from April 2020 to January 2021. Diabetic peripheral neuropathy (DPN) was diagnosed if two or more of the abnormalities of neuropathy symptoms score or neuropathy disability score were present.

Results: Among the studied subjects, 59% were males and 41% were females. Mean age was 49.22 ± 10.63 years for diabetics. 29% patients were alcoholic and 24% were smokers and body mass index (BMI) of more than 25 was found in 20% of patients. Most common of symptoms was tingling (37.14%). 29 subjects had neuropathic signs and neuropathy disability score (NDS) more than or equal to 2 with 28 of them having reduced nerve conduction velocity and loss of vibration in 65.52% patients. A higher prevalence of DPN was found among DM duration of greater than 5 years.

Conclusions: The present study showed a significant correlation between DPN, duration of diabetes and BMI. Detection of neuropathic symptoms and complications is therefore essential among patients with T2DM before it hampers their quality of life.

Keywords: Peripheral neuropathy, Type 2 diabetes mellitus, Neuropathy symptoms score, Neuropathy disability score

INTRODUCTION

T2DM is one of the most common chronic diseases across the world and number of diabetic patients is continuously on the rise. There were 366 million people with diabetes globally and is expected to rise to 552 million by 2030.¹ It is a progressive disease and badly affects the quality of life of the patients due to micro and macro-vascular complications involved with it.² The prevalence is high, genetic factors appear to be stronger, onset of diabetes is now being seen at a younger age and obesity is no longer a common cause. India is having the second largest

number of diabetic patients in any given country. The burden of diabetes has steadily increased over the past years in India and across the globe, with India contributing a major part of the global burden.³ Studies on complications of diabetes in India are hence of great interest. The global epidemic of diabetes and its most common complication, neuropathy is asking for real urgent measures and interventions to address all such modifiable risk factors. Otherwise, it is estimated that in the year 2050, one-third of the projected 9.7 billion population will have diabetes and half of those will have neuropathy. The most prevalent complication is

neuropathy of which distal symmetric polyneuropathy (for the purpose of this primer, referred to as diabetic neuropathy) is very common. Diabetic neuropathy is a loss of sensory function beginning distally in the lower extremities that is also characterized by pain and substantial morbidity. Over time, at least 50% of individuals with diabetes develop diabetic neuropathy. Few studies have been done to study the prevalence of neuropathy in newly diagnosed diabetes. Screening and early identification of neuropathy among diabetics can be a crucial opportunity for course modulation for keeping the glycemic control to optimal levels and within recommended targets. In developed countries, where foot care practices are widely followed, most of the available modalities have been evaluated for.⁴ With this background in mind the current study was designed to calculate and determine the prevalence for diabetic neuropathy in newly diagnosed T2DM among hospital attendees.

METHODS

A cross sectional observational study were conducted among randomly selected 100 patients of newly diagnosed T2DM and attending medicine OPD of sub district hospital Bishnah, district, Jammu, Jammu and Kashmir from April 2020 to January 2021. Patients older than 30 years of either gender, attending the medicine department OPD, diagnosed with T2DM at least since 2 years and willing to participate were included in the study. Patients of T2DM having severe co-morbidities such as stroke and chronic renal failure were however excluded from the study. Patients with chronic liver disease, chronic airway disease, critical illness, infections and patients not willing to participate were also excluded from the study.

The diagnosis of T2DM was done according to the criteria laid down by American diabetes association. A complete clinical examination was done including determining the height and weight of subjects. Peripheral neuropathy was diagnosed among T2DM patients, if two or more of the abnormalities of neuropathy symptoms score, neuropathy disability score and abnormal nerve conduction velocity were present.

NDS and presence of deep tendon reflexes/sensation were graded as normal (0), decreased (1) or absent (2).⁵ A score of 2 or more was considered abnormal. Vibration perception threshold (VPT) was tested with a tuning fork (126 Hz) on each malleolus, pain sensation by pin prick, touch sensation with a wisp of cotton and temperature sensation by a cold tuning fork. Position sense and deep tendon reflexes were also tested conventionally. Nerve conduction velocity (NCV) was studied by conventional method with surface electrodes with limbs kept warm at a temperature of 38C.⁶ Motor nerve conduction velocity and compound muscle action potential (CMAP) amplitude were measured in the ankle to knee segment of peroneal nerves. If NCV was less than or equal to 39 m/s and/or CMAP amplitude was less than or equal to 1 mv, it was also considered as abnormal.

The study was conducted after taking due approval from institutional ethics committee. The results were analyzed using microsoft excel software (latest version). Statistical mean and standard deviation were calculated and resultant data was subjected to chi square test to find out the difference that exists between our observed values and the values we expected if there were no relationship at all in the population. P value was also found out for ascertaining the significance of data. P<0.05 was taken as significant.

RESULTS

In the present study, out of 100, only 35 patients had neuropathic symptoms of more than or equal to 1. Most common of symptoms was: tingling (37.14%) and significant number of patients had burning and numbness alongside tingling as basic symptom (Figure 1).

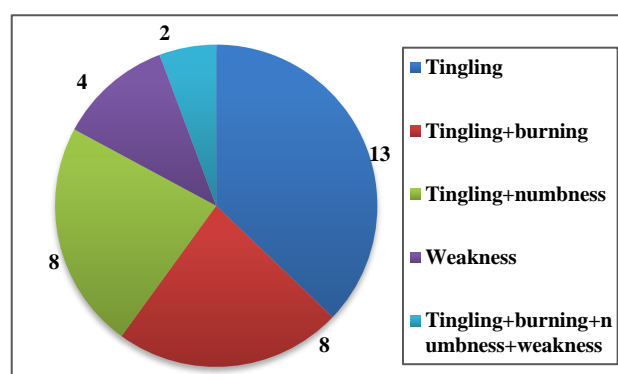


Figure 1: Neuropathic symptoms among subjects.

Out of the 35 patients showing neuropathy symptoms, only 29 subjects had neuropathic signs and NDS more than or equal to 2. Loss of vibration was found to be the major abnormality among patients, with as many as 19 (65.52%) showing this problem. This sense was heightened in the remaining patients, who showed either loss of ankle jerk or loss of position or touch along with T2DM. There was an abnormal nerve conduction velocity in almost all of patients showing neuropathic signs with as many as 28 of them having reduced nerve conduction velocity (Figure 2).

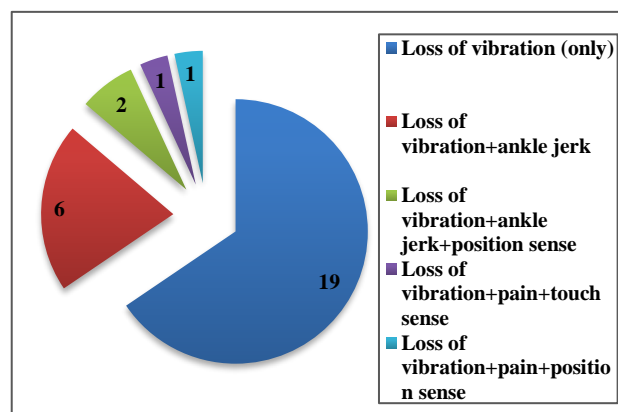


Figure 2: Neuropathy signs among subjects.

Table 1: Social demographic, clinical and biochemical characteristics of study participants (n=100).

Sr. No.	Parameters	Neuropathy diabetics (n=29)	Non-neuropathy diabetics (n=71)	Chi square; p value
1	Gender			
	Male	17	42	0.862
	Female	12	29	0.353
2	Age (mean±SD)	49.22±10.63	48.71±10.85	
	<50	14	34	0.035
	≥50	15	37	0.852
3	Duration in months (mean±SD)	15.35±4.68	6.51±1.24	
	≤12	6	41	0.966
	>12	23	30	0.001*
4	Smoking (smoker/ non-smoker)			
	Yes	8	16	5.827
	No	21	55	0.016*
5	Alcohol use			
	Alcoholic	11	18	1.689
	Non-alcoholic	18	53	0.194
6	Blood pressure			
	Systolic	132.5±16.9	122.8±11.6	
	Diastolic	83.1±11.0	77.6±9.2	
7	Glucose			
	Fasting BS	215.3±82.9	186.6±73.4	
	Postprandial BS	323.4±74.82	285.32±58.56	
8	BMI	24.5±5.1	22.8±4.9	
	<25	22	58	7.758
	≥25	7	13	0.005*

*p≤0.05 is considered significant.

Among the studied subjects, 59% were males and 41% were females. Mean age was 49.22±10.63 years for diabetics with neuropathy and 48.71±10.85 for diabetics with non-neuropathy. BMI of more than 25 was found in 20% of patients (mostly females). 29% patients were alcoholic and 24% were smokers. Among co-morbidities, hypertension was more prevalent, with 32% being hypertensive, with equal no of males and females (Table 1).

DISCUSSION

DPN is one of the commonest complications of DM. High blood sugar levels in the body damages nerves in almost all parts and this hampers the carrying of messages between the brain and other parts of the body. This means one may not feel heat, cold or pain in one's feet, legs or hands. Even a cut or sore on the foot may remain unnoticed. This loss of sensation is of special concern as they may even lead to amputations eventually. DPN can also increase the risks of cardiovascular events and the associated mortality.⁷ In the present study, almost one third of the newly diagnosed patients of T2DM presented physiological evidence of diabetic peripheral neuropathy, similar to the findings of Franklin et al Nielsen et al also observed neuropathy in 38% of patients using vibration sensation.^{8,9}

Around 29% of T2DM were found to suffer from peripheral neuropathy in our study. This is similar to the findings of other studies on diabetic peripheral neuropathy, Yang Q et al and Qin L et al however reported a quite higher prevalence of DPN at 71.0% and 80.0%, respectively.^{10,13-15} This could be due to the reason that they used the NSS and NDS to assess DPN in their study population. The prevalence of DPN was found to be associated with the longer duration of DM. This was in line with the results of previous studies as well.^{10,16} In all such instances where glycemic control is poor, the duration of DM increases the risk of complications and accelerates them too. Ratzman et al observed a quite lower prevalence of diabetic neuropathy (6.3%) in their study.¹⁷ A study done in India by Ashok et al observed a prevalence of 5.4% among their patients.¹⁸ Such a lower prevalence in comparison to our study can be attributed to the fact that our study used clinical and electro-physiological study of patients, which includes neuropathy symptom and disability scores and nerve conduction, while the other two studies used biothesiometer, a less sensitive method. Awareness levels among patients could also influence the study results.

Moreover, physical exercise can increase micro-vascular circulation, release of neurotropic factors, help in attenuation of oxidative stress and attainment of physiological well-being of the body and therefore

absence of physical activity is often found to be an independent predictor of DPN.^{19,21}

In our study, a higher prevalence of DPN was found among males than females and further found that DM duration of greater than 5 years was significantly associated with DPN. This can be associated with chronic hyperglycemia causing activation of multiple biochemical pathways and oxidative stress in diabetic neurons, leading to nerve damage and neuronal ischemia.²²

Smoking was also found to be associated with DPN, with a higher percentage of smokers having detected with DPN compared to non-smokers. This was similar to the findings of studies by Van et al and MD'Souza.^{23,24} The association between smoking and DPN can be explained by the fact that smoking causes neuropathy via neuronal ischemia from endothelial damage, increased inflammation, oxidative stress, interference with glucose metabolism, and from direct toxic effects on the neurons.²⁵

Inferring casual association is difficult due to the cross-sectional nature of the study and lack of nerve conduction testing. The duration of diabetes as measured in this study might not reflect the true duration of the disease, but the time since diagnosis and actual diabetes onset might precede diagnosis in T2DM. Moreover, patient-recall bias may be affecting the performance of the symptom and signs data/score. Therefore, the limitations of the study was mainly found to be the sample size itself and as for the elevated prevalence found among patients, the statistical data showed results which could not be considered as fully representative.

CONCLUSION

The present study showed, by multiple logistic analyses, a significant correlation between peripheral neuropathy and duration of diabetes, age of the patients and postprandial blood glucose levels. This study holds importance as it is first of the kind from this geographical unit of rural northern India. There was a high prevalence of DPN and patients in the habit of smoking, ageing above 40 years and DM duration of above 5 years were found at a higher risk. This makes detection of neuropathic symptoms and complications essential among patients with T2DM before it hampers the quality of life of the patients.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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