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Original Research Article

Prevalence of neuropathy in type 2 diabetic patients at sub-district hospital Akhnoor

Chandan Sharma[1], Ashima Badyal[2]*

[1]Department of Medicine, Sub-District Hospital, Akhnoor, District Jammu, Jammu and Kashmir, India
[2]Department of Biochemistry, Government Medical College, Jammu, Jammu and Kashmir, India

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***Correspondence:**
Dr. Ashima Badyal,
E-mail: badyal.ashima@gmail.com

ABSTRACT

Background: Type 2 diabetes mellitus (T2DM) is a progressive disease and hampers the quality of life of the patients due to micro and macro-vascular complications associated with it, like: neuropathy. Peripheral neuropathy leads to numbness, loss of sensation, and sometimes pain in the feet, legs, or hands.
Methods: A cross sectional study was conducted among 200 randomly selected T2DM patients of either gender presenting to the medicine outpatient department (OPD) of sub district hospital Akhnoor from August 2020 to February 2021.
Results: Almost half of the participants having duration of DM for more than 10 years and a mean age of 56.8±12.2 years. Based on the Michigan neuropathy screening instrument (MNSI) assessment, 41% of study participants had a score of ≥6 in the history questionnaire. The most frequently reported symptoms among patients were numbness and pain while walking, which was present in 80.5% and 70.5% of study participants, respectively. Around 32-40.5% of T2DM patients were found to suffer from peripheral neuropathy in our study. A significantly higher prevalence of diabetic peripheral neuropathy (DPN) was found among males (43.7%) than females (37.1%).
Conclusions: Early detection of DM and appropriate intervention and effective control is important for effective management among patients, especially with higher body mass index (BMI), obesity or with advancing age.

Keywords: Diabetes, Peripheral neuropathy, Quality of life

INTRODUCTION

Type 2 diabetes mellitus (T2DM) is one of the most common chronic diseases across the world and number of diabetic patients is constantly on the rise. T2DM in India has certain differences compared to Europeans as they are at a higher risk of developing T2DM. Also, according to Indian Council of Medical Research–India Diabetes (ICMR-INDIAB) study, 2011, there are 62.4 million people living with diabetes in India. Globally, there were 366 million people with diabetes in the year 2011 and is expected to rise to 552 million by 2030.[1] T2DM is a progressive disease and hampers the quality of life of the patients due to micro and macro-vascular complications associated with it.[2] It is further estimated that of the expected 9.7 billion individuals living in 2050, one-third of living population in the year 2050 will have diabetes and half of those will have neuropathy. There is considerable interest in the studies in India on complications of diabetes. Neuropathy is the most common complication associated with diabetes, globally, and requires a public health order to positively affect such risk factors with growing urgency.[3]

In a prevalent complication like neuropathy, distal symmetric poly-neuropathy (or diabetic neuropathy) is most common. Diabetic neuropathy is characterized by pain and associated with substantial morbidity. It is known that, at least 50% of diabetics develop diabetic neuropathy over time. Peripheral neuropathy leads to numbness, loss of

sensation, and sometimes pain in the feet, legs, or hands. It is the most common complication of diabetes. About 60% to 70% of all people with diabetes will eventually develop peripheral neuropathy. Some people do not suffer much pain and this nerve damage is not inevitable either. Studies have shown that people with diabetes can reduce their risk of developing nerve damage by keeping their blood sugar levels as close to normal as possible.

Screening and early identification of neuropathy therefore offers a crucial opportunity for the patients with diabetes to actively alter the course of suboptimal glycaemic control to recommend levels. In developed countries, where foot care practices are widely followed, most of the available modalities have also been evaluated.[4] With this background in mind, the current study was designed and aimed to assess the prevalence for diabetic neuropathy among hospital attendees.

METHODS

A cross sectional study was conducted among 200 T2DM patients of either gender, presenting to the medicine outpatient department (OPD) of sub district hospital Akhnoor, from August 2020 to February 2021. Patients with age greater than 30 years, diagnosed with T2DM at-least since 2 years, willing to participate, attending the medicine department OPD, were included in the study. T2DM patients having severe co-morbidities such as stroke or chronic renal failure or stroke, or such patients, who were provisionally referred to the medicine OPD for consultation, or pregnant females were excluded from the study.

Simple random sampling method was used for the selection of the participants. Early symptoms to be examined for peripheral neuropathy were identified to be: numbness, tingling, prickling, burning, pinching, buzzing and deep stabs, but some people have to bear with sharp pain or exaggerated sensitivity to touch. Assuming the prevalence of diabetic neuropathy to be 16% and accounting for margin of error of 5% and using the formula.

$$z^2 x\, p(1-p)/e^2$$

The sample size of 200 was found to be suitable.[5,6] Data was analyzed using statistical package for the social sciences (SPSS) version 15. The results were calculated as percentages and Chi square test was used for further analysis and summary.

RESULTS

The study included a total of 200 consecutive type 2 diabetes patients aged 30 years and above with a mean age of 56.8±12.2 years. The mean body mass index (BMI) of the study participants was 23.5±5.8 kg/m^2 and mean duration of diabetes was 7.6±6.1 years (Table 1).

Table 1: Baseline characteristics (n=200).

S. No.	Characteristics	Mean±SD
1	Age (years)	56.8±12.2
2	Age at diagnosis (years)	50.3±11.4
3	Duration of DM (years)	7.6±6.1
4	Systolic BP (mm Hg)	132.5±16.9
5	Diastolic BP (mm Hg)	77.6±13.4
6	BMI (kg/m^2)	23.5±5.8
7	Fasting blood sugar (mg/dl)	188.4±76.0
8	Postprandial blood sugar (mg/dl)	259.8±104.6
9	HbA1c (%)	9.4±2.4
10	High density lipoprotein (mg/dl)	33.7±8.9
11	Low density lipoprotein (mg/dl)	102.1±36.3
12	Triglycerides (mg/dl)	160.6±103.9
13	Total cholesterol (mg/dl)	119.5±46.2

More than half, i.e. 103 (51.5%) of the participants were males, 40.50% had family history of diabetes mellitus. In total 79.0% were found to be devoid of regular physically activity (Table 2).

The overall prevalence of diabetic peripheral neuropathy (DPN) among study participants based on diabetic neuropathy symptom score (DNS) questionnaire was 40.5% and based on diabetic neuropathy examination (DNE) score, the prevalence was 32% (Table 3).

With almost half of the participants having duration of DM for more than 10 years, the majority had dyslipidemia, deranged blood sugar levels and hypertensive. Moreover, 23.0% had cardiovascular disease (Table 4).

Table 2: Socio-demographic, clinical and laboratory characteristics of the study participants and their association with the presence of DPN (n=200).

Variables	Neuropathy present (n=42)		Neuropathy absent (n=58)		Total	Chi-square; p value
	N	%	N	%		
Gender						
Male	45	43.7	58	56.3	103	1
Female	36	37.1	61	62.9	97	0.317
Age (years)						
<60	39	40.2	58	59.8	97	0.111
≥60	42	40.8	61	59.2	103	0.739

Continued.

Variables	Neuropathy present (n=42)		Neuropathy absent (n=58)		Total	Chi-square; p value
	N	%	N	%		
Duration (years)						
≤10	35	35.0	65	65.0	100	1.494
>10	46	46.0	54	54.0	100	0.222
Family history of DM						
Present	40	49.4	41	50.6	81	0.012
Absent	41	34.5	78	65.5	119	0.112
Smoking						
Yes	41	56.9	31	43.1	72	0.012
No	40	31.3	88	68.8	128	0.302
Alcohol intake						
Yes	28	50.9	27	49.1	55	7.716
No	53	36.6	92	63.4	145	0.004
Regular physical activity						
Present	11	26.2	31	73.8	42	42.975
Absent	70	44.3	88	55.7	158	0.00001

Table 3: Presence of peripheral neuropathy among diabetic patients (n=200).

Tools	Neuropathy present, N (%)	Neuropathy absent, N (%)
DNS questionnaire	81 (40.5)	119 (59.5)
DNE score	64 (32)	136 (68)

Table 4: Relation of BMI, blood sugar and hypertension with peripheral neuropathy among diabetic patients (n=200).

Variables	DNS			DNE		
	Neuropathy present	Neuropathy absent	Total (n)	Neuropathy present	Neuropathy absent (%)	Total (n)
BMI (kg/m^2)						
<18.5	4	8	12	3	9	12
18.5-24.9	47	58	105	37	68	105
25-29.9	23	44	67	18	49	67
>30	7	9	16	6	10	16
Fasting blood sugar						
<125	22	26	48	17	31	48
≥126	59	93	152	47	105	152
Systolic BP (mm Hg)						
<140	55	93	148	39	109	148
≥140	26	26	52	25	27	52
Diastolic BP (mm Hg)						
<90	60	94	154	43	111	154
≥90	21	25	46	21	25	46

Table 5: Responses to DNS (based upon MNSI) questionnaire in patients with type 2 DM (n=200).

S. no.	Symptoms	Answers in yes (%)
1	Are your legs and/or feet numb?	161 (80.5)
2	Do your legs/feet hurt when you walk?	141 (70.5)
3	Do you ever have burning pain in your legs/feet?	138 (69.0)
4	Are your symptoms worse at night?	127 (63.5)
5	Do you have prickling feelings in your legs/feet?	125 (62.5)
6	Do you feel weak all over most of the time?	92 (46.0)
7	Are your feet too sensitive to touch?	82 (41.0)
8	Do you get muscle cramps in your legs and/or feet?	74 (37.0)

Continued.

S. no.	Symptoms	Answers in yes (%)
9	Has your doctor ever told you that you have neuropathy?	69 (34.5)
10	Is the skin on your legs/feet so dry that it cracks open?	56 (28.0)
11	Does it hurt when the bed covers touch your legs/feet?	47 (23.5)
12	Have you ever had open sore on your foot?	46 (23.0)

Based on the Michigan neuropathy screening instrument (MNSI) assessment, 41% of study participants had a score of ≥6 in the history questionnaire. The history questionnaire of the MNSI assessment showed that most of the participants had at least one of the symptoms of peripheral neuropathy. The most frequently reported symptoms among patients were numbness and pain while walking, which was present in 80.5% and 70.5% of study participants, respectively, while the least frequently reported symptoms was presence of open sore in foot which was present in 23.0% of patients (Table 5).

DISCUSSION

The spectrum of clinical neuropathic syndromes described in patients with diabetes mellitus includes dysfunction of almost every segment of the somatic peripheral and autonomic nervous system. Chronically high blood sugar levels damage nerves in almost all parts of the body. These damaged nerves cannot effectively carry 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, for example a cut or sore on the foot may remain unnoticed. This loss of sensation is a special concern. People who lose sensation are the ones most likely to get ulcers on their feet and to end up needing amputations.

Around 32% of type 2 diabetic patients were found to suffer from peripheral neuropathy in our study. This is similar to the findings of other studies on DPN but in contrast to the findings of Kaewput et al and Perrin et al, in which the prevalence ranged from 3.0% to 16.6%, and which formed the initial assumption for the present study.[5-10] The possible reasons for this difference could be difference in study settings. Yang et al and Qin et al reported a prevalence of DPN of 71.0% and 80.0%, respectively, which was relatively higher to our findings.[11,12] This could be due to the reason that they used the neuropathy symptom score (NSS) and neuropathy disability score (NDS) to assess DPN in their study population. A significantly higher prevalence of DPN was found among males than females. This was similar to the results of some other studies by Kaewput et al and Braffett et al but different from the findings of Sendi et al who observed no gender difference in DPN prevalence, which can again be attributed to difference in societal settings among the different study areas.[6,8,9]

Being older was not found to be significantly associated with DPN the in the study. But this can just be an aberration as it is an established fact that nerve function deterioration with age, even in the absence of DM. 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.[5,7,8,12] In such instances where glycemic control is poor, the duration of DM increases the risk of complications and accelerates them too.

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 a study by Velde et al.[13] Dyslipidemia and elevated systolic blood pressure was prevalent in diabetic patients suffering from DPN. This was similar to findings from some other studies.[8,9,14] This could be associated with the problems of management of hypertension among patients with type 2 DM.

In nutshell, higher prevalence of DPN is of grave concern, as this may lead to ulceration, amputation, life-long disability, and poor quality of life.[15] DPN can also increase the risks of future cardiovascular events and the associated mortality.[16]

The limitations of the study was mainly found to be the 'sample size' itself as for the elevated prevalence found among patience the statistical data showed results which could not be called conclusive or fully representative. However, the findings were in themselves very new and in line with various other studies done on the subject.

CONCLUSION

The prevalence of DPN found through this study was alarmingly high among patients with T2DM. This holds importance as it is first of the kind study from this sector of rural northern India. Early detection of DM and appropriate intervention and effective control is important for effective management among patients, especially with higher BMI, obesity or with advancing age. This makes early detection of neuropathic complications almost essential among patients with type 2 diabetes before it hampers the quality of life of the patients.

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