ORIGINAL ARTICLE

Prevalence of Diabetic Peripheral Neuropathy (DPN) and Its Risk Factors

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ABSTRACT

Objective: To determine the prevalence of diabetic peripheral neuropathy (DPN) and its risk factors.
Methods: This descriptive cross sectional study was conducted at diabetic clinic, Rotary club and Department of Medicine Unit-II, PMC Hospital Nawabshah from March 2017 to February 2018 where consecutive 200 diabetic patient were examined. After taking consent demographic data was collected including age, regular visit to physician, physical activity, duration of diabetes, history of hypertension and medication. Blood pressure was recorded and blood glucose level was checked. All diabetic patient were advised HbA_1C and lipid profile. For presence of neuropathy. Michigan neuropathy screening instrument (MNSI) was used. All the data was collected on a proforma and statistically analyzed.
Results: Diabetic peripheral neuropathy (DPN) as determined by MNSI was detected in 85 patients out of 200, having prevalence of 42%. Duration of diabetes, Hypertension, Hyperglycemia and pre diabetes were significantly associated with DPN.
Conclusion: Prevalence of diabetic peripheral neuropathy (DPN) is high. Only early detection and strict control of hyperglycemia and other risk factors can prevent this debilitating complication

Key Words: Diabetic Neuropathy, Risk Factors, MNSI, HbA_1C, Hyperglycemia.

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INTRODUCTION:

Peripheral Neuropathy is most common complication of diabetes. Clinically peripheral neuropathy is present when signs and symptoms of peripheral nerve dysfunction occur in diabetes after ruling out other causes of neuropathy. Diabetic peripheral neuropathy (DPN) causes disability due to ulceration on feet, amputation, disturbance in gait and falls.

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The quality of life is lowered and health care cost is increased with DPN[1]. Only treatment of DPN is glycemic control and pain management. Sensory symptoms of peripheral neuropathy start in toes and with time involve upper limbs in a glove and stocking pattern. In early stage, motor involvement is not prominent. Patients present with numbness, tingling, pins and needle sensation and burning. Symptoms are not indicator of axonal loss. Those having painful symptoms often have minimal sensory deficit on examination[2]. Pain affects 20 to 30% of patients with peripheral neuropathy and is main reason for seeking medical care[3,4].

Numbness due to peripheral neuropathy causes loss of balance leading to falls. Neuropathy is one of risk factors for falls in diabetes along with vestibular dysfunction and retinopathy. Risk of fall is 2-3 time more common in diabetes with neuropathy than diabetics without neuropathy[5]. Patients with DPN are at risk of ulceration and amputation of lower limbs. Risk of amputation is increase by 15-fold in diabetes[6]. Suspected DPN

patients should have blood glucose or HbA1C measured to confirm diabetes or pre diabetes along with vitamin B12 and para protein level. Vitamin B12 deficiency can occur after prolonged use of metformin[7]. Types 2 DM have lifetime incidence of neuropathy of 45% while 54 to 59% of type1 DM have this complication[8]. Controlling hyperglycemia in type1, DM reduces incidence of neuropathy by 60-70 %[9] while control of glucose in type 2DM reduce incidence of neuropathy by 5 to 7%[10]. Despite glucose control, about 40% of diabetic patients develop neuropathy suggesting involvement of other risk factors.

Many studies have implicated obesity, hypertriglyceridemia, hypercholesterolemia, hypertension, and smoking in pathogenesis of neuropathy[11]. This study was conducted at Diabetic clinic Rotary club and PMC Hospital Nawabshah to determine prevalence of diabetic peripheral neuropathy (DPN) among patients attending this clinic and to identify risk factors of DPN.

METHODS:

This descriptive cross sectional study was conducted at diabetic clinic, Rotary club and department of Medicine Unit II, PMC Hospital Nawabshah from March 2017 to February 2018. This is weekly free diabetic clinic run by rotary club where more than 50 patients come every week for regular follow up and get free medication. After taking consent, patient's demographic data was collected including age, gender, regular visit to physician, physical activity, duration of diabetes, history of hypertension and medication used. Blood pressure was recorded of all patients and blood glucose was checked. All diabetic patients were advised HbA1C and lipid profile and were asked to bring report on next visit. For presence of DPN, Michigan Neuropathy Screening instrument (MNSI) was used which has s ensitivity of 80% and specificity of 95%[12]. MNSI is simple, validated and non-invasive measurement tool. By this tool, we can diagnose DPN in early stage and can intervene to improve quality of life by preventing disability and amputation. MNSI has two steps. First Step is questionnaire that assesses the presence of neuropathy symptoms.

History questionnaire

(1) Are your feet numb?
(2) Is there burning pain in your feet?
(3) Are your feet sensitive to touch?
(4) Is there pricking sensation in your feet?
(5) Do the bed covers hurt your legs/feet on touching?
(6) In shower, can you differentiate cold water from hot water?
(7) Is there any open ulcer on your feet?
(8) Has doctor told you that you are having neuropathy?
(9) Do your symptoms become worse during night?
(10) During walking, do you hurt your legs/feet?
(11) During waking, can you sense your feet/legs?
(12) Is your skin so dry that it cracks on feet/legs?
(13) Any amputation in the past?

Yes response to items is counted as 1 point except that No response to item 6 and 11 is counted as 1 point. Second step of MNSI is examination part. It assesses on each foot five variables and total score is 10 on both feet.

Physical Examination:

1.	Appearance Deformities, Dry skin, callus Infection	Normal=0	Abnormal=1
2.	Ulceration	Absent=0	Present=1
3.	Ankle reflexes with=0.5 Reinforcement	Absent=1	Present Present=0
4.	Vibration Present=0	Absent=1	Reduced=0.5
5.	Monofilament Absent=1	Absent=1	Reduced=0.5

The cases were consider positive for neuropathy if in history part score is 7 or more out of 13 points or in examination part has score of 2 or more out of 10. These patients were having score of 7 or more on basis of symptoms

RESULTS:

Two hundred patients were included in this study. Out of these 170 were having type2 DM and 30 patients were having type1 DM. Age of patients was from 15 to 70 years and mean age was 42.5 ± 27.5. 120 patients were male (60%) and 80 were female (40%). BMI was (mean +SD) 23±3.

Base line characteristics are given in table-I. DPN as determined by MNSI was present in 85% patients out of 200 giving prevalence of 42%, and score of equal or more than 2 on examination part. The clinical and laboratory features of all of the patients with DPN and without DPN are mentioned in table-II. All the diabetic patients who were having DPN were of type2 DM. Duration of diabetes, hyperglycemia, hypertension and pre diabetes were association of DPN. Frequency of risk factors associated with DPN are shown in Table-III.

Table I. Baseline Characteristics of Study Patients

No of Patients	200
With Hypertension	85
Without Hypertension	115
Age	15-70 years (42.5±27.5)
Male	120
Female	80
BMI	23±3
Type 1 DM	30
Type 2 DM	170

Table II. Clinical and Laboratory Features of Patients with DPN & without DPN

Variables	With DPN	Without DPN
No of Patients	85	115
Duration Diabetes	10.5±9.5	3±2
SBP	152.5±7.5	135±25
DBP	90±10	80±10
Fasting Blood glucose	185±65	120±20
HbA_1C	9.5±2.5	6.5±0.5
Total Cholesterol	191.5±10.5	138.5±1.5
LDL	100±8.0	76.5±8.5
HDL	32.5±8.5	2ŏ±4
Triglyceride	150±6	161.5±17.5

Table III. Frequency of Risk Factors Associated with Diabetic Peripheral Neuropathy (DPN)

Risk Factors	No. of Cases	%
Duration of Diabetes for more than Five Years	64	90
Hyperglycemia	49	70
Hypertension	35	50
Pre-Diabetes	3	12

DISCUSSION:

In this study prevalence of DPN was 42% and duration of diabetes, uncontrolled blood of glucose, hypertension and pre diabetes were significant risk factors associated with DPN. This prevalence of 42% of DPN in this study is consistent with studies from many countries in which prevalence is 45%[13] from Saudi Arabia, 31.9% from Iran[14], 25.6% from united Arab emirates[15], and 29.2% from India[16]. This difference in prevalence is attributed to different types of diabetes, difference in duration of diabetes and different diagnostic criteria used by investigators Elrefac et al[17] studied 229 patient with diabetic foot in Jordan and prevalence DPN was 98% in this group.

In another study by Al-Sarihin et al[18] 202 patient with type1 and type2 diabetes were studies at tertiary care hospital in Jordan and prevalence was 54.4%. This high prevalence in two studies is attributed to difference in study groups that included patients with type1 diabetes having advanced disease with complication who were referred to tertiary care hospital and patients having diabetic foot[17].

Duration of diabetes is a major risk factor for DPN regardless of age of patient[18]. However, stringent control of blood sugar in type1 diabetes

can reduce prevalence of DPN despite long duration of diabetes. In follow up study for 24 years in type1 diabetes, DPN was noted in 64% of poorly controlled patients as compared to 0% in strictly controlled diabetic patients[19].

Distribution in time of onset for DPN is different. Some patient devolved DPN after long duration of diabetes while others develop this at pre diabetes stage[20]. Hyperglycemia is other risk factor for DPN. Every 1% increase in HbA_1C will result in higher frequency of DPN by 10-15% [21]. Therefore strict glycemic control to reduce the incidence of DPN is aim of every clinician. However there is important difference in outcome between type1 diabetes and type2 diabetes. Optimal glycemic control in type1 diabetes prevents DPN while intensive glucose control is not helpful in reducing DPN in type2 diabetes[22].

Hypertension is identified as another risk factor for DPN. Hypertension increase the risk of DPN four times in a period of 6 years[23]. On other hand in type2 diabetes tight control of hypertension did not reduce worsening of DPN[24].

Pre diabetes is also a risk factor of DPN. Three patients with DPN were having impaired fasting blood glucose suggesting pre-diabetes as a case of DPN. In kORA study (cooperative research in the region of Augsburg) prevalence of DPN was 13% in impaired glucose tolerance (IGT)[25].

In pre diabetes group, IFG (impaired fasting glucose) +IGT (impaired glucose tolerance) but not isolated IGT or IFG was associated with risk of DPN[26].

Every diabetic patient on diagnosis should undergo neurological examination to assess for DPN as DPN can be present at onset due to long period of pre diabetes in that patient.

Limitation of this study are that sample size was small. Second limitation is that nerve conduction study (NCS) was not done. Another limitation that MNSI can assess only large fiber Neuropathy but not Small fiber neuropathy, which is component of DPN.

CONCLUSION:

Prevalence of diabetic peripheral neuropathy (DPN) is high. Early detection and strict control of hyperglycemia and other risk factors are mandatory to prevent this debilitating complication.

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