RESEARCH ARTICLE

PREVALENCE AND RISK FACTORS OF DIABETIC PERIPHERAL NEUROPATHY AMONG TYPE-2 DIABETIC PATIENTS PRESENTING TO SMIMS HOSPITAL, TAMIL NADU

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ABSTRACT

Background: Diabetic Peripheral Neuropathy is a cause for significant morbidity and mortality. It includes mononeuropathies, polyneuropathies, plexopathies, and radiculopathies. Usually presents with sensory symptoms in the toes or feet, but in some patients there is loss of feeling mainly in hands.

Aims & Objective: To estimate the prevalence and risk factors of peripheral neuropathy among Type-2 Diabetic patients presenting to SMIMS Hospital.

Material and Methods: Study Design is Cross Sectional Study at SMIMS. Study Period is 10th September- 5th December 2011 & Sample Size is 283. A stratified random sampling and convenient sampling was done. The patients were questioned and Examined using a Pre-tested Questionnaire followed by a symptomatic history taking and Clinical Examination.

Results: Prevalence of neuropathy among Diabetics is 33.33%. Hypertensive Diabetics, Diabetes with Dyslipidaemia have a higher risk of developing neuropathy.

Conclusion: In this Study the prevalence of Diabetic-related Neuropathy is 33.33%. The study also shows risk factors for developing neuropathy such as Increasing duration of Diabetes, Comorbid diseases, Low Socio Economic Status.

KEY-WORDS: Diabetes Mellitus; Prevalence; Neuropathy; Insulin; Neuropathy Symptom Score

Introduction

Diabetic Peripheral Neuropathy (DPN) is one of the common complications of Diabetes. Prevalence in South India is 26.1 %.[1]

It is best described as a stocking-glove neuropathy, affecting the longest nerves first before progressing proximally. Significant motor symptoms occur usually late. Detection is complicated as the disorder affects a variety of nerve fibers.

The early recognition and appropriate management of neuropathy in the patient with diabetes is important for a number of reasons: (1) A number of treatment options exist for symptomatic diabetic neuropathy; (2) Up to 50% of DPN may be asymptomatic, and patients are often at risk of insensate injury to their feet[2]; (3) As >80% of amputations follow a foot ulcer or injury, early recognition of at-risk individuals[3], provision of education, and appropriate foot care may result in a reduced incidence of ulceration and associated diabetic complications.

Several methods are commonly used to screen and assess DPN. These include: (1) Reflex testing (2) Superficial pain testing (3) Light touch perception (4) Vibration testing (5) Sympathetic skin response (6) Quantitative sensory testing (7) Nerve conduction studies.

Various Scoring systems include:

I. NSS: Neuropathy Symptom Score
II. DNE: Diabetic Neuropathy Examination Score
III. NDS: Neuropathy Disability Score
IV. NIS-LL: Neuropathy Impairment Score in Lower Limbs
V. MNSI: Michigan Neuropathy Screening Instrument

VI. CE-V: Clinical Examination Score of Valk
VII. TSS: Total Symptom Score

We used a modified NSS[4] developed by the Mayo Clinic to assess Symptoms are score appropriately and modified NDS[5] to assess Scoring based on signs tested via examination.

Aim and Objectives: (1) To estimate the prevalence of peripheral neuropathy among Type-2 Diabetic patients presenting to SMIMS Hospital; (2) To determine the risk factors for Diabetic peripheral neuropathy.

Materials and Methods

- **Study Design:** Cross Sectional Study
- **Study Setting:** Sree Mookambika Institute of Medical Sciences (SMIMS)
- **Study Population:** Type 2 Diabetic Patients presenting to SMIMS
- **Study Period:** 10th September - 5th December 2011
- **Sample Size:** 283
- IEC clearance was taken.
- **Sampling Methods:** A stratified random sampling and convenient sampling was done for the required sample size. Written consent of patients was taken. The patients were questioned and Examined using a Pretested Questionnaire followed by a symptomatic history taking and Clinical Examination. At the end, each individual was informed about Diabetes and its complications. Advice was given accordingly regarding compliance, diet, foot care.
- **Materials Used Included:** Questionnaire, Measuring Tape, Weighing Scale (Bathroom), BP Apparatus, Stethoscope, Knee Hammer, Cotton, Thumb Pins, 128 Hz Tuning Fork, Test Tubes with Hot & Cold Water, Excel work sheet, PASW18 were used.
- **Description of Interventions:**
  - *Inclusion Criteria:*
    - All Diabetic Patients coming to SMIMS
    - Age group > 35 yr
  - *Exclusion Criteria:*
    - Patients not willing to give consent
    - Patients with other obvious causes of peripheral neuropathy
- **Outcome Measures:** Using Weighing Scale and measuring tape, we obtain BMI. Using BP Apparatus & Stethoscope, we obtained BP. Using NDS Score, we estimated Neuropathy.

  For the NSS, Patients were asked for the presence or absence and the potential exacerbation of muscular cramps, numbness, abnormal hot or cold sensations, tingling sensations, burning pain, aching pain, and irritation by bed clothes in the lower legs and feet. If the patient did not have any symptoms, a score of zero was given. A score of one was given for the presence of each symptom, and a score of two was given if the patient described nocturnal exacerbation. The summation of all symptom scores gave the NSS. A NSS of three or more was considered abnormal.

  For the NDS, it includes the following components: *(a) Motor Tests:* Reflexes (Achilles & Patellar). A score of 0 was given if the reflex was normal and a score of 1 was given if the reflex could be elicited with reinforcement. A score of 2 was given if the reflex was absent. Average of total of both sides together represented the Total Reflex score. *(b) Sensory Tests:* (i) Pin Prick: Using a pointed metal, Light Touch: Using a strip of cotton ball; (ii) Light Touch; (iii) Vibration: Using 128 Hz Tuning Fork & (iv) Temperature: Using Tubes filled with hot & cold water. A score of 1 was given if the patient failed to perceive a stimulus at the base of the toe; 2 if patient failed to perceive a stimulus at the mid-foot; 3 at the heel; 4 at the lower leg; 5 at the knee. The average score of both feet was entered as the sensory score. The summation of Reflex and Sensory Scores for each modality was entered as NDS. An NDS of 5 or more is indicative of existence of moderate or severe neuropathy.

Results

Prevalence of neuropathy among Diabetics is 33.33%. 63% of patients with higher duration of diabetes have neuropathy. This shows that higher the duration of Diabetes, higher the chances of the patient developing neuropathy (Table 1).

Table-1: Prevalence of Neuropathy among Diabetics

Duration	Neuropathy		Total (%)
	Yes (%)	No (%)	
> 9 Years	62 (63.3)	36 (36.7)	98 (100)
≤ 9 Years	18 (12.7)	124 (87.3)	142 (100)
Total	80 (33.3)	160 (66.7)	240 (100)

Chi Square 66.77; OR 11.86 (6.23-22.56); p- <0.001; N=240

Table-2: Prevalence of Neuropathy among Hypertensive

Hypertension	Neuropathy		Total (%)
	Yes (%)	No (%)	
Yes	39 (50)	39 (50)	78 (100)
No	41 (25.3)	121 (74.7)	162 (100)
Total	80 (33.3)	160 (66.7)	240 (100)

Chi Square 14.44; OR 2.95 (1.67-5.20); p <0.001; N=240

Table-3: Prevalence of Neuropathy among Dyslipidaemia

Dyslipidaemia	Neuropathy		Total (%)
	Yes (%)	No (%)	
Yes	14 (58.3)	10 (41.7)	24 (100)
No	66 (30.6)	150 (69.4)	216 (100)
Total	80 (33.3)	160 (66.7)	240 (100)

Chi Square 7.5; OR 3.18 (1.34-7.53); p- 0.006; N=240

Table-4: Prevalence of Neuropathy among taking Insulin Therapy

Insulin	Neuropathy		Total (%)
	Yes (%)	No (%)	
Yes	28 (80)	7 (20)	35 (100)
No	52 (25.4)	153 (74.6)	205 (100)
Total	80 (33.3)	160 (66.7)	240 (100)

Chi Square 40.15; OR 11.76 (4.85-28.54); p- <0.001; N=240

Table-5: Prevalence of Neuropathy among who Missed Doses

Doses Missed	Neuropathy		Total (%)
	Yes (%)	No (%)	
Yes	8 (80)	2 (20)	10 (100)
No	72 (31.3)	158 (68.7)	230 (100)
Total	80 (33.3)	160 (66.7)	240 (100)

Chi Square 10.22; OR 8.77 (1.81-42.37); p- 0.001; N=240

Table-6: Prevalence of Neuropathy among NSS

NSS	Neuropathy		Total (%)
	Yes (%)	No (%)	
> 3	64 (64.6)	35 (35.4)	99 (100)
< 3	16 (11.3)	125 (88.7)	141 (100)
Total	80 (33.3)	160 (66.7)	240 (100)

NSS: Neuropathy Symptom Score; Chi Square 74.35; OR 14.28 (7.35-27.74); p- <0.001; N=240

Table-7: Prevalence of Neuropathy among SEC

SEC	Neuropathy		Total (%)
	Yes (%)	No (%)	
< 11	59 (37.8)	97 (62.2)	156 (100)
> 11	21 (25)	63 (75)	84 (100)
Total	80 (33.3)	160 (66.7)	240 (100)

SEC: Socio-Economic Class; Chi Square 4.038; OR 1.825 (1.01-3.293); p- 0.04; N=240

50% of hypertensive among diabetics has neuropathy. This shows that Hypertensive Diabetics have a higher risk of developing neuropathy (Table 2).

58% of diabetics with dyslipidaemia have neuropathy. This shows that Diabetics with Dyslipidaemia have a higher risk for neuropathy (Table 3).

80% of diabetics on insulin therapy have neuropathy. This shows that Diabetic patients on insulin mode of therapy have a higher risk of developing neuropathy as compared to those Diabetics on oral hypoglycaemic agents (Table 4).

80% of diabetics who missed >5 doses/month have neuropathy. This shows that Diabetic patients who miss more than 5 doses of their hypoglycaemic agents in a month have a higher risk for neuropathy (Table 5).

65% of diabetics with NSS >3 have neuropathy. This shows that 65% of our study groups have developed neuropathy complication (Table 6).

37% of diabetics of low SEC have neuropathy. This shows that Diabetic patients in low SEC have a higher risk of developing neuropathy (Table 7).

Discussion

A study by Fargol Booya et al[6] on risk factors for diabetic neuropathy (110 patients in Iran), correlates with age and duration of disease. But there was no correlation between high BP and Hyperlipidaemia which was significant in our study.

A study by Andrea Vincent et al[7] on dyslipidaemia effect on diabetic neuropathy correlates with our study.

A study by R Pradeepa and M Rema[8] in urban south Indian population correlates with age and duration of diabetes in our study.

A Study by K Y Forrest et al[9] on Hypertension as a risk factor for diabetic neuropathy correlates with our study.

A Study by MJ Young et al[10] on A multicentre study of the prevalence of diabetic peripheral neuropathy in the United Kingdom correlates with duration of Diabetes in our study.

A Study by Karter et al[11] on Missed doses and Poor Glycemic Control correlates with our study.

A Study by Boulton AJM et al[12] on the prevalence of symptomatic diabetic neuropathy in an insulin-treated population correlates with our study in showing higher prevalence of neuropathy among Diabetic patients on insulin mode of therapy.

Another Study by Diabetes Control and Complications Trial Research Group[13] on Effect of intensive treatment of diabetes on the development and progression of long term complications in insulin-dependent diabetes correlates with our study.

Limitations of our Study

- Mixed Population - Selected population is mixture of both rural and urban types.
- Lack of availability of Monofilament for detailed examination.

Conclusion

Our Study has shown the prevalence of Diabetic-related Neuropathy to be 33.33%. The study also shows risk factors for developing neuropathy such as Increasing duration of Diabetes, Comorbid diseases such as Hypertension and Dyslipidaemia, Low Socio Economic Status, Individuals who miss doses of Hypoglycaemic agents > 5 times/month, Poor glycaemic control all showed increased risk for developing neuropathy.

Diabetic individuals must adhere to strict glycaemic control, low socioeconomic status people are to be educated about Glycaemic control with adequate foot care, Regular blood sugar checks must be made mandatory, and compliance to drug therapy should be checked frequently by family members. Comorbid conditions such as Hypertension and Dyslipidaemia must also be kept on check in order to prevent or progress neuropathy.

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