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ORIGINAL RESEARCH

DIABETIC NEUROPATHY AND ITS CORRELATION WITH DIABETIC CONTROL

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ABSTRACT

Background: Diabetic neuropathy is one of the chronic complications of diabetes mellitus (DM) developing in 50% of patients with diabetes. The 10g monofilament test is an inexpensive and accurate test to detect loss of protective sensations in diabetic patients.

Aims: We assessed the prevalence of Peripheral neuropathy and the clinical profile and risk factors responsible for development of neuropathyin patients of type 2 diabetes mellitus (T2DM) from Nalanda Medical College & Hospital.

Design: Cross-sectional study conducted on 100 T2DM patients presenting to the medicine or specialized OPD of a hospital in Patna between one year.

Methods: Detailed clinical history including age, sex and duration of diabetes, history of smoking and hypertension and predominance of different intricacies like retinopathy, nephropathy, coronary artery infection (CAD) and stroke was taken. Patients were inspected for neuropathy with 10g monofilament testing and tuning fork testing and examined for HbA1C, FBS, PP2BS. Statistical examination was finished utilizing free examples t test and Mann Whitney U test.

Results:Diabetic neuropathy was available in 69 out of 100 patients. Solid association was found between duration of diabetes and glycaemic control. There was no huge relationship with BMI.

Conclusion:High prevalence of diabetic peripheral neuropathy of 69% was seen in ourstudy. Higher prevalence was seen in longer duration diabetics and poor glycaemic control; thereby making it imperative to screen for this complication early and control glucose levels.

INTRODUCTION

Diabetic neuropathies are a group of nerve problems brought about by diabetes. Individuals with diabetes can, over the long haul, foster nerve harm all through the body. Certain individuals with nerve harm have no side effects. Others might have side effects like pain, shivering, or deadness loss of feeling-in the hands, arms, feet, and legs. Nerve issues can

happen in each organ framework, including the intestinal system, heart, and sex organs [1]. Around 60 to 70 percent of individuals with diabetes have some type of neuropathy. Individuals with diabetes can foster nerve issues whenever, yet hazard ascends with age and longer duration of diabetes. The most noteworthy paces of neuropathy are among individuals who have had diabetes for somewhere around 25 years [2]. Diabetic neuropathies additionally have all the earmarks of being more normal in individuals who have issues controlling their blood glucose, likewise called glucose, just as those with significant levels of blood fat and pulse and the people who are overweight.

Curiously, somewhere in the range of 25 and 62% of patients with idiopathic fringe neuropathy are accounted for to have prediabetes; among these 11-25% are thought to have fringe neuropathy, and 13-21% have neuropathic pain [3, 5, 6, 7]. Populace based investigations recommend an angle for the predominance of neuropathy, being most noteworthy in patients with manifest diabetes mellitus, trailed by people with impeded glucose resilience, then, at that point, by subjects with hindered fasting glucose and, at long last, least in those with normoglycaemia [7].

Sensorimotor neuropathy is set apart by agony, paraesthesia and tactile misfortune (table 1). The various components associated with various agony sensations are still inadequately seen, yet there is plentiful proof that unusual releases from infected somatosensory neurons are mindful [4, 5]. Unconstrained movement in the fringe nociceptor framework may likewise trigger focal sensory system changes answerable for hyperalgesia and allodynia [4, 5]. Cardiovascular autonomic neuropathy (CAN) may add to myocardial dead tissue, harmful arrhythmia and unexpected demise. Gastroparesis is the most incapacitating confusion of gastrointestinal autonomic neuropathy. Genitourinary autonomic neuropathy can cause sexual brokenness and neurogenic bladder [5]. The point of our article was to sum up the etiology, structures and expected helpful methodologies of diabetic neuropathy.

METHODS

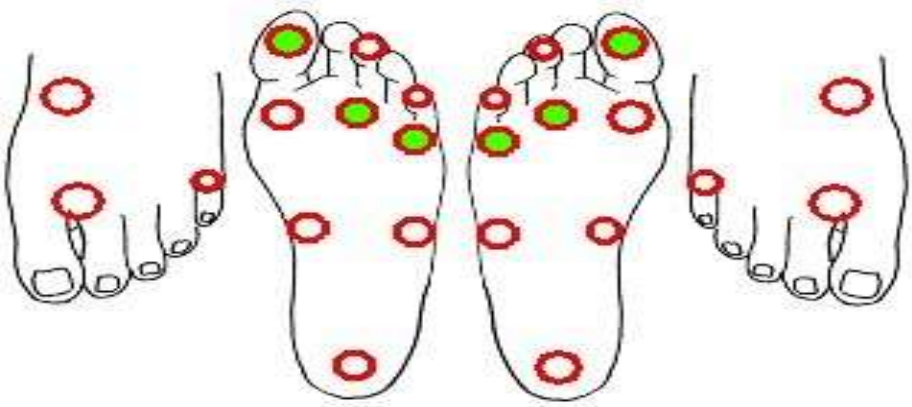
This case-control study was undertaken between one year in the Nalanda Medical College & Hospital. One hundredpatients with Type 2 diabetes were included in the study from the outpatient department of medicine. Due to limited resources, we could not ensure random sampling. The base sample size needed for this review was determined to be utilizing the recipe N = 10k/p where k is the quantity of covariates (k = 4), and p is the extent of the most modest number of cases in the populace (p = 0.39) [16].

Written consent was obtained from all patients following a comprehensive explanation of the purposes of the study. Inclusion criteria were: patients with previously diagnosed Type 2 diabetes and aged between 30-60 years with an intact site for testing for nerve conduction studies. Patients with significant sicknesses or some other co-morbidities, outer muscle issues, analyzed or suspected neuropathy because of some other reason, and patients consuming medications that might have impeded review brings about any way were barred from the review.

After the clinical history was recorded, the subjects went through a definite actual assessment, which included checking the patient for vibration, contact, lower leg jerk, and force of appendages by experienced doctors and creators, including MUN, MJ, MJ, NA, MAQ, and HM. A battery of tests, including blood glucose arbitrary (BSR), blood glucose

fasting (BSF), and HbA1C, by pathologists in the clinic on an ADVIA-1800 contraption and nerve conduction review (NCS) by experienced clinicians on a MEDULAR DEVICE were directed. In view of NCS results, the subjects were delegated either having a neuropathy or not. Those patients with diabetes with ordinary nerve work were taken as controls. Information was examined in SPSS.

Fig 1: points of testing on the plantar aspect of foot



RESULTS

SOCIO-DEMOGRAPHIC CHARACTERISTICS

The median age of the 100 diabetic patients took on the review was 56 years with and between quartile scope of 47 to 62.7 years. There were 51% female patients and 92% of the review members were hitched. Family background of diabetes was available in 61% of the patients with 31% having family background of diabetes positive in the mother. One fourth of the patients were dependent on tobacco. The median duration of diabetes history was 5 years with between quartile scope of 2 to 11 years. The median duration of taking treatment was 5 years, showing quick beginning of treatment after analysis with a median age of 5 years and between quartile scope of 2.25 to 11 years. Table 1 shows the socio-segment profile of Diabetic patients joined up in Government Hospital, Patna.

Table 1: Socio-demographic characteristics of Diabetic patients enrolled within one year

Variable		Number	95% Confidence Interval
Age (Median-IQR)	56 (47-62.7)	Mean (SD)	54.87 (10.63)
Sex			
	Male	49	39.4-58.7
	Female	51	41.3-60.6
Marital status			
	Married	92	85.0-95.9
	Widowed	08	04.1-15.0
Family history present			
	Mother	32	23.7-41.7
	Both parents	16	10.1-24.4
	Parents and sibling	07	03.4-13.7
	Mother and sibling	03	01.0-08.5

	Father	02	00.6-07.0
	Both siblings	01	00.2-05.4
Addiction			
	Tobacco	25	17.5-34.3
	Cigarette	07	03.4-13.7
	Alcoholic	04	01.6-09.8
	Cough syrup	01	00.2-05.4
Duration of disease	5 (2-11)	Mean (SD)	07.37 (6.88)
(Median-IQR) years			
Duration of drug intake	5 (2.25-11)	Mean (SD)	7.56 (6.67)
(Median-IQR)			
Total		**100**	

SIGNS AND SYMPTOMS

Weakness (62%), lethargy (54%), myalgia (39%), pins and needles feeling (37%), polyuria (36%), burning and weight loss (35% each) were commonly experienced by the diabetic patients. Amongst neurological symptoms, pins and needles (37%) burning (35%) were common positive symptoms and cotton wool sensations (28%), loss of sensation (22%) and loss of hot or cold sensation (14%) were common. Nocturia was seen in 28 percent of people. Amongst symptoms of autonomic neuropathy; nausea and fullness of abdomen was seen in 24 percent each; and sexual problems were also noted in 24% patients. Table 2 and Figure 2 show the signs and symptoms as experienced by Diabetic patients enrolled within one year in Government Hospital, Patna.

Table 2: Signs and symptoms related to diabetes experienced by Diabetic patients enrolledwithin one year

Signs/symptoms*	Number	95% Confidence Interval
Polyuria	36	27.3-45.8
Polyphagia	33	24.6-42.7
Polydypsia	34	25.5-43.7
Weakness	62	52.2-70.9
Lethargy	54	44.3-63.4
Myalgia	39	30.0-48.8
Headache	14	08.5-22.1
Swelling of face	12	07.0-19.8
Frothy urine	11	06.3-18.6
Oliguria	11	06.3-18.6
Nocturia	28	20.1-37.5
Dyspnea	19	12.5-27.8
Chest pain	15	09.3-23.3
Visual disturbances	21	14.2-30.0
Fever	08	04.1-15.0

Abdominal pain	02	00.6-07.0
Weight gain	27	19.3-36.4
Weight loss	35	26.4-44.7
Pins and needles feeling	37	28.2-46.8
Burning	35	26.4-44.7
Cottonwool appearance	26	18.4-35.4
Loss of sensations	22	15.0-31.1
Loss of hot and cold sensation	14	08.5-22.1
Nausea	24	16.7-33.2
Fullness of abdomen	24	16.7-33.2
Sexual problems	24	16.7-33.2
Urinary problems	28	20.1-37.5
Constipation	19	12.5-27.8
Nocturnal diarrhoea	05	02.2-11.2

Figure 2: The signs and symptoms as experienced by Diabetic patients enrolled within one year

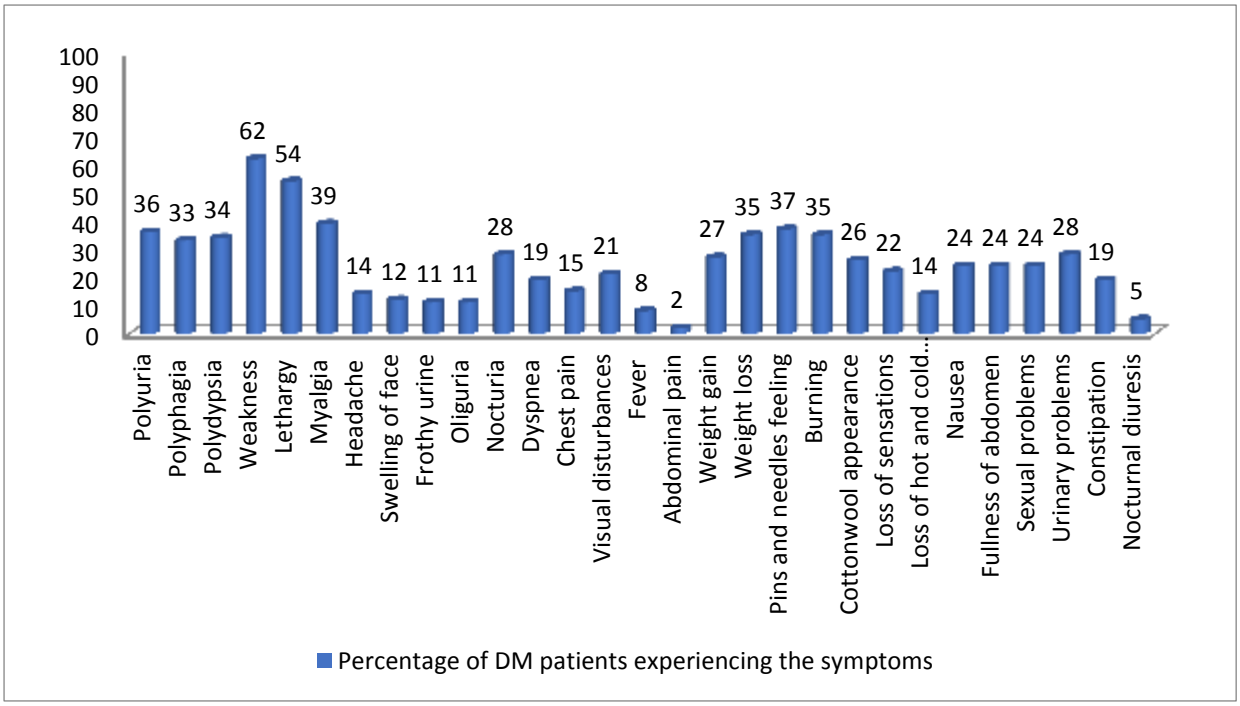


Table 3: Co-morbidities in Diabetic patients enrolled within one year

Co-morbidity	Number	95% Confidence Interval
Hypertension	48	38.5-57.7
Diabetic retinopathy	21	14.2-30.0
Diabetic nephropathy	14	08.5-22.1
Cardiovascular/ stroke	14	08.5-22.1
Tuberculosis	01	00.2-05.4

PHYSICAL AND CLINICAL FINDINGS

Median systolic and diastolic pulse was 130 mm of Hg and 80 mm of Hg separately. 14% had edema and 1 of the patients had a systolic mumble. Rest of the frameworks (per midsection, unusual tone/power) were typical. Lower leg jerk was missing in 22% of the patients. Monofilament test showed that 21% of the patients had each of the 10 focuses missing. Anomalies of monofilament testing was available in 69% of the patients. Vibration was missing in 21% patients (in the extraordinary toe) and in 17% cases it was missing in the toe and lower leg. By and large, vibration sensation was missing in 51% of the patients. Ulcers were noted in 11% patients and hard was discovered to be normal (24% of patients). Distortions were noted in 15% and venous clog was noted in another 15% of patients. The medianHemoglobin was 12.2 gm%, median Fasting glucose was 143 mmol/ltr and median 2 hours post prandial glucose esteem 217.5 mmol/ltr. Median HbA1c showing the 3-month glycaemic control was 7.95, which shows a general poor glycaemic control. Median Body Mass Index was 25.7 kg/m2. Neuropathy was obvious in 65% cases, trailed by retinopathy and nephropathy in 21% and 18% of the cases.

Notwithstanding the neuropathy information, extra information was created. Correlation was done between glycaemic control and BMI. There was no huge contrast in the various BMI classes and glycaemic control (F= 1.165, P = 0.316). There was no huge association between weight record (BMI) and neuropathy (Chi square=0.005, p=0.94) (Figure 3). We attempted to observe whether neuropathy presence was because of poor glycaemic control or regardless of whether it was impacted by the duration of long stretches of the sickness. Consequently, we did tests to observe whether there was any distinction in the method for HbA1c (Glycosylated Hb-a mark of glycaemic control in the beyond 3-4 months) and the mean duration and event or nonattendance of neuropathy. The mean duration and mean HbA1c followed a non-parametric dissemination, consequently Mann Whitney U test was performed. There was a huge contrast in the mean HbA1c and mean duration of long periods of diabetes sickness in the gatherings having and not having neuropathy (F = 4.305, p = 0.00007 and F = 3.57, p = 0.0005 individually for HbA1c and duration of illness). Since glycaemic control is accomplished by fasting and post prandial glucose levels being typical, these mean distinctions were additionally critical (t = 2.95, p = 0.003 and t = 3.12, p = 0.0024 separately

for FBS and PP2BS). Consequently, poor glycaemic control and longer duration of infection prompted neuropathy in this review.

DISCUSSION

The current review shows the middle age of the patients was 56 years with and between quartile scope of 47 to 62.7 years. There were 51% female patients. One fourth of the patients were dependent on tobacco. Family background of diabetes was available in 61% of the patients. The middle duration of diabetes history was 5 years with between quartile scope of 2 to 11 years. The middle duration of taking treatment was 5 years, showing prompt beginning of treatment after conclusion with a middle age of 5 years and between quartile scope of 2.25 to 11 years.

In this present study, the signs and symptoms experienced by Diabetic patients was Weakness (62%), lethargy (54%), myalgia (39%), pins and needles feeling (37%), polyuria (36%), burning and weight loss (35% each) were commonly experienced by the patients.Amongst neurological symptoms, pins and needles (37%) burning (35%) were common positive symptoms and cotton wool sensations (28%), loss of sensation (22%) and loss of hot or cold sensation (14 %) were common. Nocturia was seen in 28 percent of people. Amongst symptoms of autonomic neuropathy; nausea and fullness of abdomen was seen in 24 percent each; and sexual problems were also noted in 24% patients.

Common co-morbidities in present study were hypertension (48%) and diabetic retinopathy (21%). Tesfaye et al; Vascular Risk Factors and Diabetic Neuropathy NEJM 2005; The study showed that the percentages of the hypertension in patients progressed to neuropathy and not progressed to neuropathy was 25.1% and 14.9% (p=<0.001), percentages of microalbuminuria or macroalbuminuria was 31.1% and 20.1% (p=<0.001), percentages of any retinopathy was 51.2% and 31.9% (p=<0.001), percentages of proliferative retinopathy was 6.2% and 2.8% (p=0.03), percentages of cardiovascular disease was 12.8% and 4.7% (p=<0.001) respectively.

The metabolic condition is additionally shown in neuropathy, particularly the prediabetic neuropathy (16, 17). On the other hand, diet and exercise have been found to expand the reservation in prediabetic neuropathy patients (18). In this review, the Monofilament test showed that 21% of the patients had every one of the 10 focuses missing. Irregularities of monofilament testing was available in 69% of the patients. Vibration was missing in 21% patients (in the incredible toe) and in 17% cases it was missing in the toe and lower leg. In general, vibration sensation was missing or decreased in 51% of the patients. Monofilament tests initially used to analyse tactile misfortune in infection (23). Numerous planned investigations have affirmed that deficiency of tension sensation utilizing the 10-g monofilament is profoundly prescient of resulting ulceration (3,22,23).

In this present study the median systolic and diastolic blood pressure was 130 mm of Hg and 80 mm of Hg respectively. 14% had edema and 1 of the patients had a systolic murmur. Rest of the systems (per abdomen, abnormal tone/power) were normal. Ankle jerk was absent in 22% of the patients. Monofilament test showed that 21% of the patients had all 10 points absent. Abnormalities of monofilament testing was present in 69% of the patients. Vibration was absent in 21% patients (in the great toe) and in 17% cases it was absent in the toe and ankle. Overall, vibration sensation was absent in 51% of the patients. Ulcers were noted in

11% patients and callous was found out to be common (24%). Deformities were noted in 15% and venous congestion was noted in another 15% of patients.

The present study showed that the median Haemoglobin was 12.2 gm%, median Fasting blood sugar was 143 mmol/ltr and median 2 hours post prandial glucose value 217.5 mmol/ltr. Median HbA1c showing the 3-month glycaemic control was 7.95, which shows an overall poor glycaemic control. Median Body Mass Index was 25.7 kg/m^2. Neuropathy was evident in 65% cases, followed by retinopathy and nephropathy in 21% and 18% of the cases. There was no significant association between body mass index (BMI) and neuropathy (Chi square=0.005, p=0.94).

This study was carried out to find out the prevalence of diabetic neuropathy (DN), in 100 diabetic subjects, and its correlation with BMI, glycaemic control and duration of diabetes. However, a significant correlation could not be found out; the reasons could be: patients with high BMI and metabolic syndrome were likely to be detected early and hence diabetic neuropathy had yet not developed; the study being done in government hospital, which caters to patients from lower socio-economic strata, might have other reasons for neuropathy like nutritional deficiency and alcoholism even with a normal or high BMI.

CONCLUSION

Neuropathy was detected in 69% of the patients. Its presence was correlated with duration of diabetes (p=0.0005) and the level of glycaemic control (p=0.00007). However, no association was found between diabetic control and BMI.

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