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ORIGINAL RESEARCH

PERIPHERAL NEUROPATHY OCCURRENCE IN TYPE 2 DIABETIC PATIENTS VISITING AN INDIAN DIABETES CENTER

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ABSTRACT

The goal of this study was to assess the prevalence and risk factors of peripheral neuropathy in people who had just been diagnosed with type 2 diabetes. One hundred newly diagnosed type 2 diabetic patients were randomly selected for clinical and electrophysiological testing to diagnose peripheral neuropathy at tertiary care in Bhubaneswar. The Neuropathy Symptoms Score (NSS), Neuropathy Disability Score (NDS), and Nerve Conduction Studies (NCV) were used to assess peripheral neuropathy, and the diagnosis of peripheral neuropathy was made when two or more of the three abnormalities of the NSS, NDS, and NCV were present. Peripheral neuropathy affected 29 patients (29%) of the 100 newly diagnosed type 2 diabetic patients, with 17 males (28%) and 12 females (31%). Multiple logistic regression analysis reveals that the duration of diabetes has the greatest impact on the development of diabetic peripheral neuropathy, although age, systolic blood pressure, and blood glucose all play a role. Peripheral neuropathy is found to be prevalent in newly diagnosed type 2 diabetic patients in Bhubaneswar using clinical and electrophysiological approaches, with a significant link between peripheral neuropathy and diabetes duration, patient age, and postprandial blood glucose levels.

Keywords: Peripheralneuropathy,Type2diabetesmellitus, Neuropathy symptoms score (NSS),Neuropathy disability score (NDS), Nerve conductionvelocity(NCV).

INTRODUCTION

Diabetes mellitus type 2 is typically asymptomatic, and diabetic complications such as neuropathy may be the first clinical sign of the disease (1). Diabetic neuropathy is claimed to affect anywhere from 5% to 60% of people (2). The prevalence of neuropathy in newly diagnosed diabetes has only been studied in a few research. The frequency of peripheral neuropathy and its risk factors in newly diagnosed or detected type 2 diabetics in Bhubaneswar were investigated.

MATERIALS AND METHODS

For a period of 1 year, one hundred newly diagnosed type 2 diabetic patients visited the Diabetes Clinic at tertiary care in Bhubaneswar. The study excludes patients with chronic renal failure, chronic liver disease, chronic lung disease, cancer, infections, and critical sickness. The diagnosis of type 2 diabetes was made using the American Diabetic Association's guidelines (1997). A standardised questionnaire was used to collect a complete clinical history. In light clothing, a comprehensive clinical examination was performed, including height and weight. The formula for calculating BMI is weight in kilograms divided by height in metres squared.The neuropathy was assessed clinically and electrophysiologically by trained staff using a MEDLEC Electromyograph and a conventional approach using surface electrodes.

The presence of neuropathic pain or paraesthesia was assessed using a questionnaire on neuropathic symptoms and the Neuropathy Symptoms Score (NSS) (3). The calculation was done with the options of being present (1) or absent. Pain in the limbs without a history of trauma or any external source was characterised as neuropathic pain. A sensation that is typically reported as tingling, numbness, sharpness, or burning is known as paraesthesia.

The existence of deep tendon reflexes and feeling is assessed as normal [0], reduced [1], or nonexistent [2] when calculating the Neuropathy Disability Score (NDS) (3). A score of 2 or higher was considered abnormal. Vibration perception threshold (VPT) was measured using a tuning fork (128 Hz) on each malleolus, as well as pain sensation, touch sensitivity, and temperature feeling using a cold tuning fork. Traditional tests of position sensing and deep tendon reflexes were also performed.The nerve conduction velocity (NCV) (4) was measured using a traditional method using surface electrodes and limbs kept warm at 38°C. The amplitude of motor nerve conduction velocity (NCV) and compound muscle action potential (CMAP) was assessed in the leg segment of peroneal nerves (ankle to knee). It was classified as abnormal if the NCV was less than or equal to 39 m/s and/or the CMAP amplitude was less than or equal to 1 mv.

If two or more of the three anomalies of Neuropathy Symptoms Score, Neuropathy Disability Score, and aberrant Nerve Conduction Velocity were present in this study, peripheral neuropathy was identified.

STATISTIC ALANALYSIS

To compare frequencies and means, the X^2 test and Student's t-test were used. To find risk factors for peripheral neuropathy, a multiple logistic regression model was constructed.

RESULTS

The 100 newly diagnosed type 2 diabetes patients were made up of 61 men and 39 women, ranging in age from 30 to 75 years. Hypertension affected 16 individuals, 11 of them were men (18.03%) and 5 of whom were women (12.82 percent). A BMI of greater than 25 was found in 23 individuals (23%) of whom 10 (16.39%) were men and 13 were females (33.33 percent). 18 patients (18%), all of them men, consumed alcoholic beverages. 16 patients (16%) were found to have smoked, with 14 males and two females.

In this investigation, 32 patients (32%), as indicated in Figure 1, reported neuropathic

symptoms (NSS) higher than or equal to 1. Tingling was the most prevalent symptom (43.75 percent), followed by tingling and numbness (21.87), and tingling and burning feet (tingling and burning feet) (12.5 percent). Other findings included burning feet alone (12.5 percent), limb weakness (6.25 percent), and a combination of tingling, numbness, and burning feet (3.13 percent.

Figure 1: Presenting symptoms in Diabetic Peripheral Neuropathy

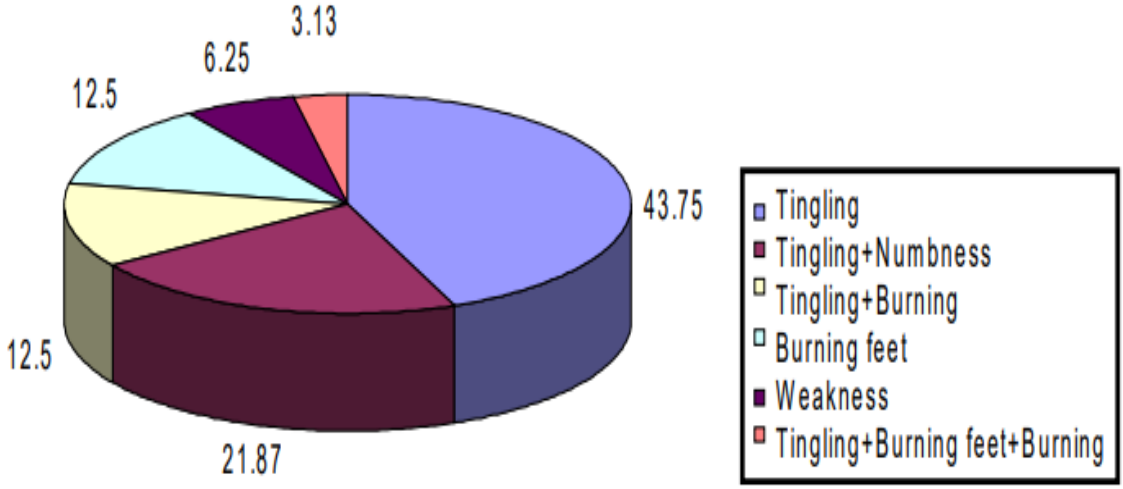
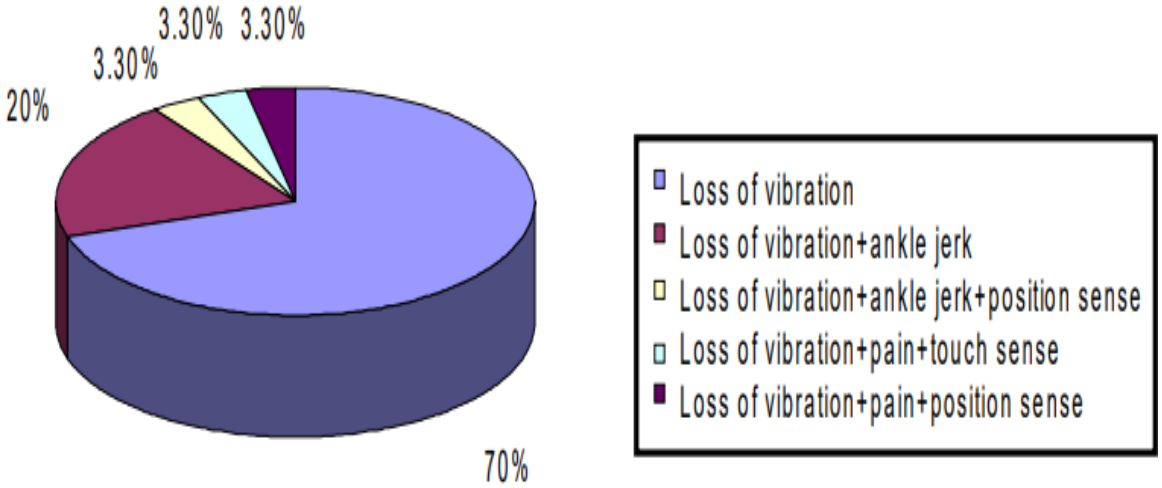


Figure 2 shows that 30 of the 100 newly diagnosed diabetic patients had neuropathic symptoms, with a Neuropathy Disability Score (NDS) greater than or equal to 2. The most common anomaly was loss of vibration with absent ankle jerk (20 percent), followed by loss of vibration and position sense with absent ankle jerk (3.3 percent), loss of vibration, pain, and touch (3.3 percent), and loss of vibration, pain(3.3 percent), and position sense (3.3 percent).

Figure 2: Neuropathic signs in Diabetic Peripheral Neuropathy



Out of the newly diagnosed diabetics, abnormal nerve conduction velocity was detected in 27 individuals (27%) with 15 males (24.6%) and 12 females (30.7%). 15 of the 27 patients showed both a low nerve conduction velocity (less than or equal to 39 m/s) and a low CMAP amp (less than or equal to 1 mv). Six patients had only slowed down.

According to the criteria for the diagnosis of peripheral neuropathy, 29 patients out of 100 newly diagnosed type 2 diabetic patients had peripheral neuropathy, with 17 males (28%) and 12 females (31%), and females were affected more than males (31:28), though the difference was not statistically significant. The neuropathic group's average age (50.44±10.35) is substantially greater ($p<0.018$) than the non-neuropathic group's (45.15 ±9.8). Peripheral neuropathy also has a significantly significant relationship with the duration of diabetes ($p<0.001$). Although not statistically significant, both systolic and diastolic blood pressures are higher in the neuropathic group (129.86±19.9 mm.Hg and 82.2±9.32 mm.Hg) than in the non-neuropathic group (123.57±13.09 mm.Hg and 80.28±9.33 mm.Hg).

The neuropathic group has greater fasting and postprandial blood glucose levels than the non-neuropathic group. The neuropathic group's fasting blood glucose (220 ±68.17 mg/dl) is greater than the non-neuropathic group's (197.23 ±57.65 mg/dl), although the difference is not statistically significant ($p<0.08$). However, the neuropathic group's postprandial blood glucose (333.3 ±84.01 mg/dl) is substantially higher ($p<0.016$) than the non-neuropathic groups. As demonstrated in Table 1, there is no significant difference in BMI between the neuropathic and non-neuropathic groups (22.61 ±3.03 and 22.95 ±3.15).

Table 1: Clinical and Biochemical characteristics of the neuropathy and non-neuropathy groups

Parameters	Non-Neuro	Neuro	t-value	P value
Age	45.16 ± 9.79	50.42 ± 10.34	2.40	0.017
Sex				
Male	43	16		
Female	26	11	0.95	0.73
Alcoholic use				
Alcoholic	10	9		
Nonalcoholic	63	22	3.23	0.08
Smoking				
Smoker	12	4		
Nonsmoker	57	23	0.15	0.10
Duration	4.74 ± 4.87	13.09 ± 7.0	6.83	0.001
Blood Pressure				
SBP	1234.0 ± 14.0	130.0 ± 20.0	1.84	0.07
DSP	80.29 ±9.32	82.0 ±9.94	0.92	0.34
P. Glucose				
Fasting	197.24 ±57.64	220.99 ±84	12.43	0.017
PP	296.46 ±60.73	333±84	2.42	0.017
BMI	22.94 ±3.14	22.60 ±3.00	0.51	0.60

Peripheral neuropathy (non-neuropathy and neuropathy) was used as the response/dependent variable, sex, alcohol usage, and smoking were categorical variables, while age, diabetes duration, blood pressure, and blood glucose (fasting and postprandial) were pooled as co-variates. The results suggest that diabetes duration has the greatest impact on diabetic peripheral neuropathy ($p<0.00$). The odds ratio (OR) results imply that age (OR1.0568),

systolic blood pressure (OR 1.0452), and blood glucose (OR 1.0054) all have a role in the development of diabetic peripheral neuropathy to some extent.

DISCUSSION

Diabetic peripheral neuropathy is one of the most prevalent consequences of diabetes, and it is sometimes the initial symptom of type 2 diabetes. In our study, 29 percent of newly diagnosed type 2 diabetes patients had clinical and electrophysiological evidence of diabetic peripheral neuropathy, which matches Franklin et al.'s findings of 27.8%. (5). In their study, Hamman et al (6) discovered that diabetic peripheral neuropathy was prevalent in 29.7% of non-Hispanic whites and 26.9% of Hispanics, respectively. Nielsen et al (7) found neuropathy in 38 percent of their patients using vibration sensation, whereas Cheng et al (8) found it in 33.9 percent of their Taiwanese diabetes patients.

In their research, however, Ratzman et al (9) and Pirart (10) found a lower prevalence of diabetic peripheral neuropathy at 6.3 percent and 7%, respectively. In a study from Sri Lanka, Weerasuriya et al (11) discovered that 9.8% of diabetics had diabetic neuropathy at the time of diagnosis. At the time of diagnosis, Ashok and his colleagues (12) discovered that 5.4 percent of their type 2 diabetic patients had neuropathy.This disparity in the prevalence of peripheral diabetic neuropathy between our study and theirs can be explained by the fact that ours used clinical and electrophysiological studies (Neuropathy Symptom Score, Neuropathy Disability Score, and Nerve Conduction Studies), whereas Ashok et al used a biothesiometer, which is a less sensitive method. Another issue could be that our patients arrive at the Diabetes Clinic considerably later than Ashok et al (12) because they are less aware of the disease.

Multiple logistic analyses revealed a strong association between peripheral neuropathy and diabetes duration, patient age, and postprandial blood glucose levels in the current investigation. Weerasuria et al (11), Ashok et al (12), and Young et al (13) all found this link in their multicenter investigation.

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