

Original Research Article

Impact of diabetes mellitus on nerves

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ABSTRACT

Background: Involvement of the peripheral and autonomic nervous systems is probably the most common complication of diabetes. The main symptoms of diabetic polyneuropathy include negative symptoms (those related to nerve fiber loss or dysfunction) such as numbness and weakness, and positive symptoms (those related to abnormal function of surviving nerve fibers) such as tingling and pain.

Methods: This was a cross-sectional study held in diabetic clinic of Nishtar hospital, Multan, Pakistan. The study included any diabetic patients showing symptoms of neuropathy.

Results: There were total of 140 in this study. This study included 85% of male and 15% of female. Most common symptoms of diabetic neuropathy were pain (70%) and tingling (70%) followed by numbness in 65% of patients. There were 28 patients in 5 years duration of diabetes, 35 people in 6-10 years duration, 21 patients in 11-15 years duration, and 14 patients in 20+ years duration.

Conclusions: Neuropathy due to diabetes is crippling especially when pain is the prominent symptoms. Autonomic symptoms like constipation and lightheadedness are discomforting for the patients. The most commonly used screening test is vibrating tuning fork test which is easy to perform in clinical setting and is not time consuming. Diabetic patients need to take special care of.

Keywords: Diabetes mellitus, Neuropathy, Nervous system

INTRODUCTION

The involvement of the peripheral and autonomic nervous systems is probably the most common complication of diabetes. Diabetic neuropathy is classified into distinct clinical syndromes.¹ A characteristic set of symptoms and signs exist for each syndrome, depending on the component of the peripheral nervous system that is affected. The symptoms include-distal symmetric polyneuropathy; autonomic neuropathy: the earliest clinical manifestation of cardiac autonomic neuropathy may be a resting tachycardia and the increased resting heart rate is due to unopposed cardiac sympathetic nerve activity, as the autonomic neuropathy progresses, the heart rate gradually slows and in advanced cases will manifest

as a fixed heart rate; thoracic and lumbar nerve root disease, causing polyradiculopathies; individual cranial and peripheral nerve involvement causing focal mononeuropathies, especially affecting the oculomotor nerve (cranial nerve III) and the median nerve and; asymmetric involvement of multiple peripheral nerves, resulting in a mononeuropathy multiplex, diabetic polyneuropathy is primarily a distal symmetric sensory polyneuropathy.^{1,2}

The earliest signs of diabetic polyneuropathy probably reflect the gradual loss of integrity of both large myelinated and small myelinated and unmyelinated nerve fibers: large nerve fiber loss leads to impairment of vibratory sensation and proprioception, and reduced ankle

reflexes; whereas small nerve fiber loss leads to impairment of pain, light touch, and temperature.³

The main symptoms of diabetic polyneuropathy include negative symptoms (those related to nerve fiber loss or dysfunction) such as numbness and weakness and positive symptoms (those related to abnormal function of surviving nerve fibers) such as tingling and pain. Symptoms start distally in the toes and feet, and positive symptoms are usually worse at night.³ Some patients, however, have few complaints. Up to one-half of patients with diabetic polyneuropathy may be asymptomatic, but the physical examination reveals mild to moderately severe sensory loss.^{1,4,5} Decreased or absent ankle reflexes occur early in the disease, while the more widespread loss of reflexes is a late finding.

METHODS

This was a cross-sectional study held in the diabetic clinic of Nishtar hospital, Multan, Pakistan. The study was carried out in the months of November 2019 to January 2020. Data were obtained on a printed questionnaire after getting an informed consult of the patients.

Inclusion criteria

Any diabetic patients showing symptoms of neuropathy.

Exclusion criteria

Any non-diabetic patients showing symptoms of neuropathy.

RESULTS

There was a total of 140 in this study. This study included 85% of males and 15% of females (Figure 1).

In our study, there were 7 patients between 30-39 years of age, 14 patients were between 40-49 years of age, 34 patients were between 50-59 years of age, 64 patients were between 60-69 years of age and 21 patients were over the age of 70 years (Figure 2).

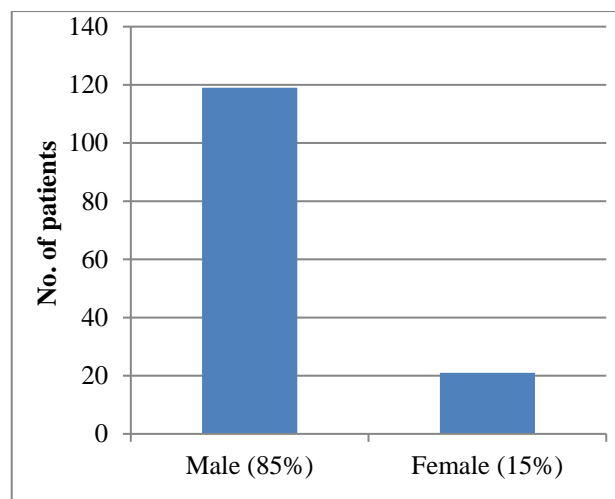


Figure 1: Distribution of patients according to sex.

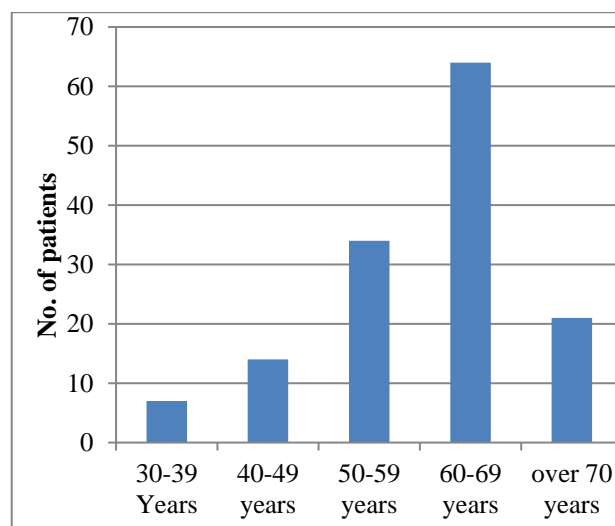


Figure 2: Distribution of patients according to age.

In this study, the most common symptoms of diabetic neuropathy were pain (70%) and tingling (70%) followed by numbness in 65% of patients. Constipation was present in half of the patients whereas abdominal distension was a note in over 55% of patients (Table 1).

Table 1: Prevalence of different symptoms of diabetic neuropathy.

Symptoms	Onset of diabetes within 5 years, N (%)	Onset within 6-10 years, N (%)	Onset duration more than 11 years, N (%)	Total, N (%)
Pain	14 (10)	14 (10)	70 (50)	98 (70)
Numbness	7 (5)	7 (5)	77 (55)	91 (65)
Tingling	7 (5)	14 (10)	77 (55)	98 (70)
Abdominal distension	14 (10)	14 (10)	49 (35)	77 (55)
Constipation	21 (15)	0	49 (35)	70 (50)
Diarrhea	0	0	0	0
Urinary symptoms	0	0	0	0
Lightheadedness	7 (5)	14 (10)	56 (40)	77 (55)
Change in pattern of sweating	14 (10)	21 (15)	28 (20)	63 (45)

In this study there were 28 patients in 5 years duration of diabetes, 35 people in 6-10 years duration, 21 patients in 11-15 years duration, and 14 patients in 20+ years duration (Figure 3).

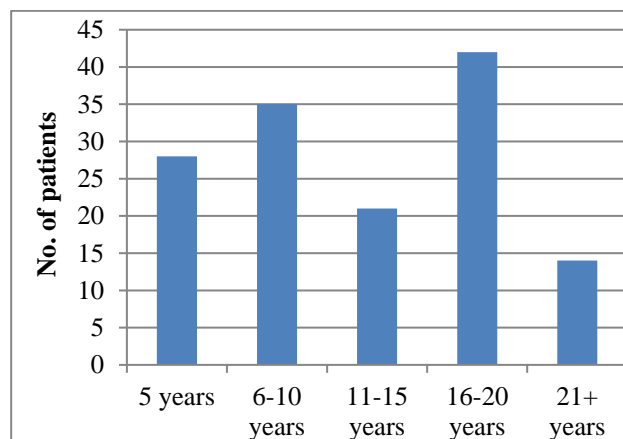


Figure 3: Distribution of patients according to duration of onset of diabetes.

There was more patients with pain in lower extremities than in upper extremities. Pain, numbness and tingling was more common in feet (Table 2).

Table 2: Distribution of symptoms in different limbs.

	Pain, N (%)	Numbness, N (%)	Tingling, N (%)
Hand	21 (15)	28 (20)	28 (20)
Legs	70 (50)	63 (45)	63 (45)
Arms	14 (10)	7 (5)	7 (5)
foot	112 (80)	112 (80)	112

In this study there were 7 patients with diminished sense of vibration who had onset of diabetes within 5 year, 14 patients had onset within 6-10 years duration, 91 patients had onset for more than 11 years of duration (Figure 4).

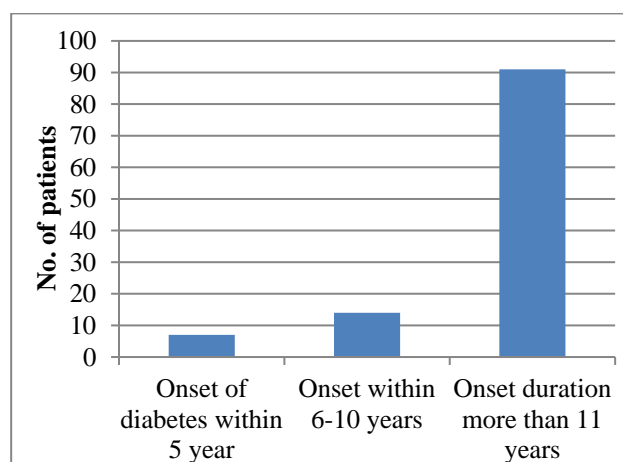


Figure 4: Prevalence of diminished vibration sense in patients.

In our study, there were 63 patients with history of hypertension and 21 with history of ischemic heart disease (Figure 5).

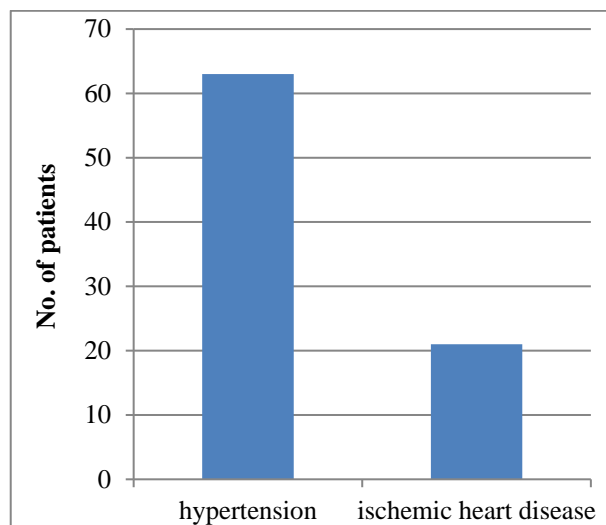


Figure 5: Prevalence of different co-morbidities in patients.

DISCUSSION

Diabetic neuropathy (DN) is the major cause of morbidity in diabetics. The initial symptom of DN is pain which renders the patients unable to walk and work. As diabetes progresses the pain, which initially started in feet, progresses to legs and upper extremity.³ This is thought to be caused by the degeneration of small nerve fibers. In this study, pain and tingling were the most common symptoms of DN which is consistent with other studies.⁴⁻⁶

Tingling and numbness are also common symptoms of DN and are caused by damage to large nerve fibers. Numbness or insensate foot can cause frequent injury and foot ulcers which can result in potential infections.⁷ Loss of vibration and position sense caused by damage to small nerve fibers can result in occasional falls and injury.⁸

Prevalence of pain increases as the time from onset of diabetes increases. The pain renders the patient unable to walk and thus limiting his ability to perform the activity of daily living.⁹ The symptoms of autonomic neuropathy such as constipation and lightheadedness were more common in patients who had diabetes for more than 10 years than those less than 10 years, which might be due to the fact that prolonged hyperglycemia has deteriorating effects on autonomic nerves.

CONCLUSION

Neuropathy due to diabetes is crippling especially when pain is the prominent symptom. The prevalence of neuropathy increases as the duration of diabetes increases. Autonomic symptoms like constipation and lightheadedness are discomforting for the patients. Early

diagnosis of neuropathy is recommended using the screening tests: the most commonly used screening test is the vibration tuning fork test which is easy to perform in clinical settings and is not time-consuming. Good glycemic control is also effective in preventing neuropathy. However, those with symptoms of neuropathy may need pharmacological treatment. Finally, diabetic patients need to take special care of their feet, as infection and ulcer often go unnoticed due to loss of sensation, podiatrists referral may be needed. Doctors in Countries with limited facilities may need to be extra vigilant as patients often do not come to seek health care unless they have severe symptoms of limb-threatening infections.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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