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RESEARCH ARTICLE

PROSPECTIVE STUDY OF BEDSIDE ASSESSMENT OF DIABETIC PERIPHERAL NEUROPATHY

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Abstract

Background: Diabetic peripheral sensorimotor neuropathy is one of the most prevalent neuropathic syndromes affecting around 50 % people with diabetes. Its development is gradual with subtle changes hence ignored. Early diagnosis using simple bedside tools is essential.

Methods: The prospective study of evaluation of peripheral neuropathy in diabetes involved examination of 500 diabetic patients for neuropathy. Pinprick, vibration sensation, perception of 5.07 Semmes Weinstein monofilament and Achilles tendon reflex were examined and impairment noted.

Results: 39 % patients had impairment of perception of Semmes Weinstein monofilament. Loss of pinprick sensation was found in 65.6 % in patients with diabetes for 5-10 years duration. Abnormal tendon reflex was seen in 64.2 % in patients with diabetes move than 10 years. Loss of Vibration (40.2 %), Wasting (16.6 %), loss of pinprick sensation (44.5%) and loss of abnormal tendon reflex (32.1 %) was found to be more common in type II diabetes.

Conclusion: Sensorimotor peripheral neuropathy was more common in long standing diabetes mellitus especially with impaired glycaemic control and type II diabetes mellitus.

Introduction:-

There is an alarming increase in prevalence and incidence of diabetes mellitus particularly in Indians (Gujral UP et al, 2013). It is estimated that by the year 2030 there will be nearly 80 million Indians with type 2 diabetes mellitus in the country (Zargar AH et al, 1999) (Wild S Et al, 2004). Diabetic peripheral sensorimotor neuropathy is one of the most prevalent neuropathic syndromes and affects around 50 % of people with diabetes. (Dyck P J et al, 1993) (Albers J W et al, 2014). Diabetic neuropathy is a destructive disease of the peripheral nerve leading to symptoms of paraesthesia, pain or problems arising from neurological deficit, (Veves A et al, 2008). The prevalence of diabetic peripheral neuropathy varies greatly in different studies (Young M J 1993) (Parthamen J, 1995) (Dyck R J, 1993) (Deli G, 2013). Development of diabetic peripheral neuropathy is gradual and changes are subtle hence leading to a tendency to ignore the signs of nerve damage (Web M D). Diabetic neuropathy leads to reduced quality of life due to the associated morbidity (Benbow S J et al 1998). Hence early diagnosis and intervention is important to tackle the problem of diabetic peripheral neuropathy. Clinical assessment of DPN using simple bedside tools is essential.

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Method:-

The study of evaluation of peripheral neuropathy in diabetics was conducted at MGIMS, Wardha (MS) from Jan 2002 to May 2003. A total of 500 diabetic patients (OPD and Indoor) were examined. Demographic details and detailed history of complaints especially pain, numbness, altered sensation and weakness in the limbs was obtained. The type and duration of diabetes was noted. The examination of peripheral nervous system included :

Examination of Sensory Modality

1. Pinprick
2. Vibration sensation
3. Perception of the 5.07 Semmes Weinstein monofilament

Examination of Limb Girth and Achilles Tendon Reflex

The sensation of pinprick was conducted using a blunted pin on the sole of the foot and the response of the patient to the pinprick was recorded as normal or abnormal. The vibration sensation was tested using a 128 Hz tuning fork and the intensity and duration of the vibration sensation by the patient was recorded as normal or abnormal.

The sensation of 5.07 Semmes Weinstein monofilament was examined on the sole of the foot. The monofilament was applied at a point on the sole of the foot and pressure was applied just enough to bend it when it applies a pressure equal to 10 gm. The inability of the patient to sense the monofilament at 1 or more sites was recorded as abnormal.

Results:-

The study was carried out in the Dept. of Surgery, MGIMS, Wardha. 500 diabetic patients were included in the study. All patients underwent clinical examination of the foot for peripheral neuropathy.

52 patients were found to have diabetic foot whereas 448 patients had diabetes without diabetic foot.

Table No. 1 shows loss of perception of 5.07 Semmes Weinstein monofilament was the commonest manifestation of sensory neuropathy (39%) in this study group.

Table 1:- Impairment of Perception of 5.07 Semmes - Weinstein Monofilament.

Perception of 5.07 Semmes - Weinstein Monofilament	Number of Patients	Percentage (%)
Normal	305	61
Impaired	195	39
Total	**500**	**100**

As per Table no. 2 it was observed that sensorimotor impairment was more common among patients with longer diabetes duration (73.2 %) in more than 10 years diabetes as against 65.5% in 5-10 years and 22.5 % among those with diabetes less than 5 years duration. The loss of prinprick sensation was found to be more common (65.6 %) among patients with diabetes for 5-10 years duration. The percentage of abnormal tendon reflex (64.2 %) and wasting (46.4 %) was highest among patients with diabetes for more than 10 years duration.

Table 2:- Relationship of Duration of Diabetes with Sensory - Motor Functional Impairment.

	Duration of Diabetes (Years)			Total
	< 5 (%)	5 - 10 (%)	> 10 (%)	
Pinprick	67 (21)	82 (65.6)	34 (60.7)	183 (36.6)
Vibration	69 (21.6)	62 (49.6)	38 (67.8)	169 (33.8)
Semmes - Weinstein Monofilament	72 (22.5)	82 (65.5)	41 (73.2)	195 (39)
Wasting	17 (5.3)	30 (24)	26 (46.4)	73 (14.6)
Abnormal Achilles Tendon Reflex	35 (11)	60 (48)	36 (64.2)	131 (26.2)
Total	**319 (63.8)**	**125 (25)**	**56 (11.2)**	**500**

Table No. 3 shows that loss of perception of 5.07 monofilament was more common in patients with type II diabetes (46.4 %). Also loss of pinprick sensation (44.5%), vibration (40.2%), abnormal Achilles tendon reflex (32.1%) and wasting (16.6%) were found to be more common among patients with type II diabetes.

Table 3:- Relationship of Type of Diabetes with Sensory - Motor Functional Impairment.

	Type of Diabetes		Total
	I (%)	II (%)	
Pinprick	25 (17.2)	158 (44.5)	183 (36.6)
Vibration	26 (17.9)	143 (40.2)	169 (33.8)
Semmes - Weinstein Monofilament	30 (20.7)	165 (46.4)	195 (39)
Wasting	14 (9.6)	59 (16.6)	73 (14.6)
Abnormal Achilles Tendon Reflex	17 (11.7)	114 (32.1)	131 (26.2)
Total	**145 (29)**	**355 (71)**	**500**

Table no. 4 suggests that the diabetic neuropathy was more common among patients with poor glycaemic control.

Table 4:- Relationship of Glycaemic Control with Sensory - Motor Functional Impairment.

	Duration of Diabetes (Years)			Total
	< 200 mg % (%)	200 to 400 mg % (%)	> 400 mg % (%)	
Pinprick	51 (24.1)	92 (42.6)	40 (54.8)	183 (36.6)
Vibration	52 (24.6)	92 (42.6)	25 (34.2)	169 (33.8)
Semmes - Weinstein Monofilament	55 (26)	100 (47.4)	40 (%4.8)	195 (39)
Wasting	22 (10.4)	42 (19.4)	9 (12.3)	73 (14.6)
Abnormal Achilles Tendon Reflex	38 (18)	73 (33.8)	20 (27.4)	131 (26.2)
Total	**211 (42.2)**	**216 (43.2)**	**73 (14.6)**	**500**

Discussion:-

Diabetic peripheral neuropathy is an important complication of diabetes leading to significant morbidity. The study of evaluation of peripheral neuropathy in diabetics presenting in dept. of surgery at tertiary rural hospital attached to MGIMS, Wardha was carried out in 500 patients over a period of 1 ½ years and the results were compared with similar studies in the field.

Impaired perception of 5.07 Semmes Weinstein monofilament was seen in 39 % of the patients. In patients having diabetic foot it was found to be 69.2 %. (RithNajarian S J et al, 1992) reported that the perception was reduced in 19 % of diabetics and (Mc Neely MJ et al) reported it was impaired in 91.3 % patients with diabetic foot as compared to 51.2 % of patients without any foot lesion. The findings of higher prevalence of sensory neuropathy among patients with diabetic foot are comparable to Mc Neely MJ et al but the number of patients affected was lower in the present study.

Of the 448 diabetics without diabetic foot 35.5 % had impaired perception of 5.07 Semmes-Weinstein Monofilaments and it was 39% in the total study group. Among 52 patients with diabetic foot 69.2 % had impaired perception of 5.07 Semmes-Weinstein Monofilaments showing higher prevalence of sensory neuropathy. (Rith-Najarian SJ, et al 1992) reported that the perception was reduced in 19% of diabetics and (McNeely MJ et al, 1995) reported that it was impaired in 91.3% of patients with diabetic foot as compared to 51.2% of patients without any foot lesion. The findings of higher prevalence of sensory neuropathy among patients with diabetic foot are comparable to McNeely MJ et al but the number of patients affected was lower in the present study.

Of the 448 diabetics without diabetic foot 33.9% had sensory neuropathy (pinprick) and it was 36.6% in the total study group. Among 52 patterns with diabetic foot, 59 6% had sensory neuropathy (pinprick) showing higher prevalence of sensory neuropathy. (Helfand AE, 1974) reported that among all diabetics, 2.4% had sensory neuropathy and 34% as reported by (Harris M et al, 1993) The findings of sensory neuropathy in the present study match with that of Harris M et al but are much higher than reported by Helfand AE. (Faris I, 1975) reported that 15 6% of patients without diabetic foot and 61.5% of the patients with diabetic foot had sensory neuropathy. The

prevalence of sensory neuropathy in patients with diabetic foot in the present study is in agreement with that reported by Faris I but the prevalence is higher among patients without diabetic foot in the present study.

Of the 448 diabetics without diabetic foot 30.8% had impaired vibration sensation and it was 33.8 % in the total study group. Among 52 patients with diabetic foot. 59.6% had impaired vibration sensation showing higher prevalence of sensory neuropathy. In a study by (Helfand AE, 1974), 16 2% of diabetic patients had impaired vibration sensation. (Young MJ et al, 1994) reported impaired sensation in 55.4% of the diabetic population. (McNeery MJ, 1995), (Lehto S et al, 1996) and (Lavery LA, 1998) reported that the vibration sensation was more commonly reduced among patients with diabetic foot as compared to those without diabetic foot. The findings of the present study are similar to the results of the studies performed in the past.

Of the 448 diabetics without diabetic foot 24.1% had impaired Achilles Tendon reflex and it was 26.2% in the total study group. Among 52 patients with diabetic foot, 44.2% had impaired Achilles Tendon reflex showing higher prevalence of motor neuropathy. (Helfand AE, 1974) reported abnormal tendon reflexes in 23.5% of the diabetic population. (Faris I, 1975) reported that 100% patients with diabetic foot had abnormal tendon reflexes as compared to 56.2% of those without diabetic foot. Faris I, McNeely MJ et al and Lehto S et al reported that the tendon reflexes were more commonly reduced among patients with diabetic foot as compared to those without diabetic foot. The findings of the present study are similar to the results of the studies performed in the past.

Conclusion:-

Sensorimotor peripheral neuropathy was more common in long standing diabetes mellitus especially with impaired glycaemic control and type II diabetes mellitus. Peripheral sensory motor neuropathy and type II diabetes are important risk factors responsible for development of diabetic foot.

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