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Peripheral Neuropathy and Central Neuropathy Among Type 2 Diabetes Mellitus

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ABSTRACT

Peripheral neuropathy in DM is an established concept and the mechanism is said to be multifactorial. When correlating the peripheral nerve involvement (median nerve conduction parameters) with the central nerve involvement (VEP parameters) among the subjects with DM based on the duration of the disease, latency and amplitude were taken for consideration. Decreased amplitudes of the median nerve and P100-N75 of VEP among the three subgroups of duration of disease. duration of disease, the median nerve impairment was more between D1 and D2 than D2 to D3.it was also observed that the peripheral nerve (median nerve) and the central nerve (optic nerve) were found to be altered among subjects with DM and the alteration was positively correlating with the duration of disease and glycemic control.

Key words: Peripheral neuropathy, Diabetes mellitus.

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INTRODUCTION

Diabetic neuropathies are the most common complications of Diabetes Mellitus. Recent studies had showed that this can even affect the higher nervous system. Peripheral neuropathy is also associated with this which causes peripheral nerves dysfunction. In recent studies the impact of DM on CNS has created much attention [1-5]. Hence this study aims to evaluate peripheral neuropathy and Central neuropathy among patients with Type 2 Diabetes Mellitus.

MATERIALS AND METHODS

Inclusion criteria

- Type 2 Diabetes Mellitus patients.
- Age group 30 to 60 years.
- Normal Visual acuity.

Exclusion criteria

Subjects suffering from the following diseases were excluded from the study.

- Group I-15 Type 2 Diabetics with duration of disease <5 years.
- Group II-15 Type 2 Diabetics with duration of disease 5-10 years.
- Group III-15 Type 2 Diabetics with duration of disease >10 years.

Design of study

Cross sectional study.

45 subjects with age group of 30 to 60 years were recruited for the study from the Outpatient department of Diabetology of Sree Balaji Medical College and Hospital. Blood parameters and serum cholesterol levels were estimated, and also neurophysiological studies were performed. Antidromic responses was done by a pair of finger ring electrodes. Almost like 3 electrodes were used (active, recording and ground). Ground was placed over the dorsum of hand. The Active ring electrode was placed around the proximal interphalangeal joint of index finger. The Reference ring electrode was placed around the distal inter phalangeal joint of the same finger. Amplitude, latency and conductive velocity was calculated.

RESULTS

Among the three subgroups of age, the mean latency was found to be 3.13 ± 0.2 in Al, 2.82 ± 0.1 in A2 and 3.08 ± 0.3 in A3. The mean amplitude was 19.46 ± 1.8 in Al, 20.9 ± 1.9 in A2 and 20.04 ± 2.2 in A3. The mean latency of GI was 3.01 ± 0.25, G2 was 3.02 ± 0.34. And in G3 was 3.2 ± 0.3. The mean amplitude was 20.3 ± 2.1 in GI, 19.9 ± 2 in G2 and 19.96 ± 1.6 in G3. The mean conduction velocity was 50.9 ± 2.7 in G1, 50.3 ± 2.4 in G2 and 49.9 ± 3.3 in G3. Overweight is said play an important role in the cascade of events that lead to insulin resistance which again leads to Diabetic complications. HbAlc was sub grouped as S6 and

>6%. The mean latency among the groups were 2.8 ± 0.13 and 3.11 ± 0.3, while the amplitude was 22.42 ± 2.2 and 19.41 ± 1.7. The conduction velocity was 53.38 ± 1.7 and 49.76 ± 2.3 among the subgroups. The Median sensory nerve latency, amplitude and conduction velocity was statistically compared and correlated with the subgroups of total cholesterol.

The mean latency of Dl was 2.9 ± 0.3, D2 was 3 ± 0.2 and D3 was 3.2 ± 0.3. The amplitude of D1, D2 and D3 were 22.3 ± 1.4, 19.6 ± 1.4 and 18.3 ± 1.3, respectively. Similarly, the conduction velocity was 53.2 ± 1.7, 50 ± 1.9 and 48.4 ± 1.9, respectively. The duration of DM was compared with the mean latency, amplitude, and conduction velocity of Median sensory nerve conduction. The mean Latency was found to be increasing as the duration. Similarly, the Conduction velocity was also decreased with increased years of disease with a Pearsons' s coefficient of r=-0.672, which again proved that as the duration of disease increases the conduction velocity decreases.

Table 1: Visual evoked potential (Mean and Standard deviation) parameters and basic characteristics.

Characteristics	N 75 (ms) Mean ± SD	P 100 (ms) Mean ± SD	N 145 (ms) Mean ± SD	Pl00- N75(μv) Mean ± SD
AGE (years)				
A1(31-40)	76.86 ± 3.6	107.54 ± 3.7	146.65 ± 6.07	3.21 ± 0. 23
A2(41-50)	75.01 ± 2.9	106.79 ± 2.3	144.65 ± 4.7	3.39 ± 0. 31
A3 (51-60)	76.95 ± 4.3	109.06 ± 4.2	147.47 ± 6.5	3.27 ± 0.2
DURATION (years)				
D1 (<5)	75 .1 ± 3.8	107.1 ± 3.7	143.9 ± 4.4	3.4 ± 0.3
D2(5-10)	75.8 ± 4.3	10.7 ± 3.7	145.4 ± 5.8	3.3 ± 0.2
D3 (>10)	78.5 ± 2.9	110.1 ± 3.6	150.7 ± 5.8	3.1 ± 0.1
FBS (mg/di)				
:S 120	69.76 ± 21.19	98.66 ± 29.29	133.75 ± 40.72	3.09 ± 0. 97
> 120	71.31 ± 22.22	100.27 ± 31.1	13 5. 73 ± 42.13	2.94 ± 0. 93
HbAlc (%)				
S6	72.03 ± 3	104.01 ± 2.8	140.4 ± 2.7	3.65 ± 0.32
>6	77.47 ± 3.4	109.21 ± 3.4	148.06 ± 5.7	3.21 ± 0.19
BMI (kg/m)				
Gl (Normal)	76.08 ± 3.9	107.62 ± 3.6	146.31 ± 5.7	3.35 ± 0.2
G2 (Overweight)	76. 12 ± 3.6	108.01 ± 3.7	145.56 ± 5.9	3.25 ± 0.2
G3 (Obese)	78.68 ± 4.4	110.82 ± 4.5	150.82 ± 6.4	3.24 ± 0.3
S. Cholesterol (mg/dl)				
>5200	76.75 ± 4	108 .58 ± 3.9	146.71 ± 6	3.29 ± 0.2
>200	75.65 ± 3.8	107.26 ± 3.7	146.6 ± 6.5	3.27 ± 0.2

DISCUSSION

The study results show that, as the age increases the nerve conduction parameters are not altered, that is age does not contribute to the changes in the median nerve conduction. This contradicts to the previous study where age plays a significant risk factor role in neuropathy among Type 2 DM. Others also found significant correlation between age and neuropathy. Previous studies showed significant correlation between FBS and Diabetic neuropathy through nerve conduction study in peripheral nerves like our results. In our study the conduction velocity of sensory nerve conduction m peripheral nerves decreases significantly with hyperlipidaemia. From the results it was found that HbA1c values are kept under control the nerve functions are professionally restored. But as per previous there is no correlation between Diabetic neuropathy and HbA1c, it is only the intensified diabetic treatment that is going to have a positive influence on patients with diabetic neuropathy [6-9].

CONCLUSION

The Median nerve latency increased with duration of disease and increasing levels of Glycosylated Hb. The amplitude and conduction velocity decreased with increased years of disease and Glycosylated Hb. The VEP latencies, N75, Pl00 and N145 all increased with increasing years of disease and increasing levels of Glycosylated Hb. The P100-N75 amplitude decreased with increased years of disease and increasing levels of Glycosylated Hb. FBS, BMI did not show significance, but

showed a positive correlation with neural impairment of both the median and optic nerve.

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ETHICAL APPROVAL

The study was approved by the Institutional Ethics Committee.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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