The Frequency of Abnormal Visual Evoked Potential in Iraqi Diabetic Patients

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Summary:

Background: *Diabolic neuropathy is one of the most common complications of diabetes and has protean clinical presentation. The pathophysiologic mechanisms that underlie these changes are not clearly understood; proposed mechanisms include both the formation of sorbitol by aldose reductase and the formation of advanced glycosylation end products.*
Patients & methods: *Forty-nine unselected diabetic patients attending the diabetic clinic in Al.Rasheed teaching hospital were studied between December 1996 & July 1997 for the prevalence of visual evoked potential (VKP) and its relation with various clinical aspects of diabetic neuropathy, nerve conduction velocity, autonomic function test and Q-T interval.*
Results: ***The*** *mean age was 33.7±I3.1 years. The mean duration of diabetes was 5.8±5.77years. 26 patients had type I and 23 patients had type II. The prevalence of VHP abnormality was 17%, the main affect was on p 100 latency.*
Conclusion: *VEP abnormality detected in some patients, which was significantly correlated with the nerve conduction velocity (NCV) and retinopathy.*
Keywords: *Diabetic neuropathy, visual evoked potential, nerve conduction study.*

Introduction:

Diabetic neuropathy is one of the most common complications of diabetes and has protean clinical presentation. [L] A peripheral, symmetric sensorimotor neuropathy is the most common form of diabetic neuropathy, where other forms include cranial and peripheral motor neuropathy and autonomic neuropathy. Electrophysiological studies demonstrate subclinical abnormalities include slowed motor and sensory nerve conduction in most patients, after 10-15 years of diabetes. The visual evoked potential reveal the functioning of the macular cone projection to the occipital pole, in the disease affecting the visual pathway the visual evoked potential may show changes in (1) amplitude, (2) latency and (3) wave form. [' '] Abnormalities in the visual acuity have no effect on the visual evoked potential unless the visual acuity is so poor that the patient cannot see the check board pattern. [""]

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Patients & methods:

Adult diabetic patients attending the endocrine clinic at Al.Rasheed teaching hospital between December 1996 & July 1997 were included in the present study. For every patient a detailed history, general medical examination and neurological examination including fundoscopic examination to detect diabetic retinopathy were done. Patients with clinical evidence of heart or respiratory disease or on chronic medications other than insulin or antidiabetic agents (GAD) were excluded. The autonomic functions were assessed using Ewing test that described by Ewing and Clark in 1982. [' '] An electrocardiography (ECG) and the Q-T interval for each patient was measured using lead II in which the Q-T interval was best seen at rest. The Q-T interval was measured from the beginning of the Q or (R) to the termination of the T wave. The measured Q-T (Q-Tm) was corrected for rale by using Bazzett's formula, that is Q-Tc = Q-Tm/ V(R-R) and Q-Tc more than 440 msec was regarded as prolonged Q-T interval.[(]
Nerve conduction velocity (NCV) was determined for every patient in the neurology unit in Hammad Shihab Teaching Hospital (HSTH), using the median nerve (sensory and motor) in the upper limb, the sural nerve (sensory) and the lateral popliteal nerve (motor) in the lower limb. For sensory NCV ring electrodes used for stimulation and needle electrodes for recording. For motor

NCV, surface electrodes used for stimulation and needle electrodes for recording.

Visual evoked potential was determined for 36 of 49 patients in HSTH, during the test each patient was asked to watch an alternating black and white check board pattern which was projected on a screen, when the patient watch this pattern shift, it produce a characteristic wave form from which can be scored from the scalp over the posterior portion of the head, the latency, duration of the response and the amplitude of the peak were measured, the patient should be cooperative enough to sit still for 20 minutes and watch the pattern. ' ' According to special protocol used in HSTH, the result regarded abnormal if there was prolonged latency of more than 111 msec, interval latency of 8 msec or more, amplitude in one eye is more than 3 times the amplitude in the other eye, or abnormal waveform. The aim of the study was to through some light on the prevalence and various clinical aspect of diabetic neuropathy, the effect of diabetes mellitus on NCV, the status of visual evoked potential and their interrelationship in Iraqi diabetic patients.

Statistical analysis

Student's t- test for quantitative values, standard error of the mean between percentage and the chi square test were used for comparison of the groups with each other.

Results:

Forty-nine adult diabetic patients studied; their mean age was 33.7±13 years with a range of 18-64 years. The mean duration of diabetes since the time of diagnosis was 5.4±5.8 years with a range from newly discovered diabetes to 30 years. Twenty-six patients had IDDM; their mean age was 23.7±7.5 years. The mean duration of symptoms before the diagnosis was 2.5±1.5 months (range: 1 week-6 months). Twenty-three patients had NIDDM, their mean age was 45±7.6 years with a mean duration of diabetes 5.36±5.9 years and the mean duration of symptoms before the diagnosis was 1.2± 0.8 years (range: 1 month -2 years).

The prevalence of diabetic neuropathy was 55%, it was related to the duration of the illness. The commonest symptom was numbness, the best physical sign was impairment of touch sensation and the ankle jerk was the commonest and the earliest to be affected. The arms were less severely affected than the legs. There was a slowing of NCV with increasing duration of diabetes and showed highly significant correlation with the subjective and objective sensory finding. The prevalence of diabetic autonomic neuropathy (DAN) was 35%, the parasympathetic affection occurred earlier than the sympathetic and isolated sympathetic involvement was rarely encountered. The background retinopathy detected in 18% more in IDDM than NIDDM (23% vs. 13%), while the proliferative retinopathy occurred in 12% and was more in IDDM than NIDDM (15% vs. 9%).

Table I, 2 show that there was a slowing of both sensory and motor NCV with increasing duration of diabetes. The mean duration of diabetes for those with abnormal NCS 7.2 vs. 2.5 years for those with normal NCS. The sural nerve was the most severely affected, the response was not obtainable in five often patients with duration of diabetes of 10 years or more.

Table (1): The mean SCV and the mean MCV of the median nerve in diabetes in relation to the duration of the disease.

Group	No of Patients out of 49	SCV Mean±SD	MCV Mean±SD	P value
(A) Newly Discovered	10	44.8±4.5	54.9±5.6	B vs. A* < 0.005 (S)
(B) 5-10 years	29	39.4±5.2	46.5±4.5	C vs. B* <0.005(S)
(C) =■ 10years	10	25.5±3.6	39±4	C vs. A* <0.005(S)

♦Significant P-value <0.05

Table (2): The mean MCV of the lateral popliteal in diabetics with increasing duration of the disease.

Group	No of Patients	MCV Mean:-SD	P value
(A)Newly Discovered	10	45.7±4.5	B vs. A* <0.005 (S)
(B)5-10 years	29	28.8±5.4	C vs. B* O.005 (S)
(C) =■ 10years	10	39.9±5.2	C vs. A* <0.005 (S)

***Significant P-value <0.0t>**

The visual evoked potential (VEP) was done for thirty-six patients, six of them had abnormal results, tow patients has prolonged latency in both eyes, two patients had prolonged latency in one eye and the other two patients had intervisual latency >eight msec. No abnormalities of the amplitude or waveform were detected. Table (3) show that there were significant correlation between the VEP and the results of NCS and retinopathy, while the correlation between the VEP, the results of autonomic function and the Q-Tc interval were not significant.

Table (3): Correlation of VEP with the NCS, definite DAN, retinopathy and prolongation of Q-Tc interval.

Group	(A) Normal VEP (No 30)	(B) Abnormal VEP (No 6)	P value A vs. B
Abnormal NCS	16	5	<0.05 (S)*
Definite DAN	9	2	>0.05 (Ns)**
Retinopathy	6	4	<0.05 (S)*
Q_Tc >440 msc	3	2	>0.05 (Ns) **

* Significant P-value <0.05

** Insignificant P-value >0.05

Discussion:

In this study, the prevalence of diabetic neuropathy was 55%, ranging from 80% for patients with duration >10 years, 46% for those with 5-10 years duration and 10% for patients with newly discovered diabetes, it was higher in NIDDM than IDDM (60% vs. 50%).The estimate of the prevalence of diabetic neuropathy differ widely, ranging from 0-93%, depending on the methods of investigation used, the diagnostic criteria, the nature of the patients group and the study parameter.[6] Pirart published his findings from a large prospective study on 4400 patients observed [illegible] the prevalence of [illegible]

arms were less frequently and less severely affected than legs, an affect may be related to the nerve length.[7]

The prevalence of VEP affection in our study was 17%, the main effect was on P100 latency whether in both eyes, in one eye or the intervisual latency, no abnormalities of amplitude or waveform recorded. There was a significant correlation between the VEP, the NCS, and retinopathy, which is similar to the observation of Akinsi A. et al who noticed that the VEP latencies of diabetic children were significantly prolonged when compared with the control and correlate with significant impairment of NCV. [4] Ziegler O. et al suggested that abnormal VEP are partly reversible except with advanced retinopathy and include functional disturbances related to glucose metabolism. "[3] Aznabev MT. et al founded that a reliable prolongation of latency P100 was detected in children with insulin dependent diabetes mellitus.[5] Costache D. et al concluded that the gradual alteration of the Visual Evoked Potential [illegible] at the patients with diabetic retinopathy represents a prognosis [illegible] the disease.[13] Further studies are needed to determine the detailed neurophysiological importance of VEP as a predictor [illegible] of the retina, the optic nerve and the [illegible] of the surgical results on the eyes of the diabetics.

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