Co-relation Study of HbA1C and NCV in Mixed Nerve

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Research Article

Abstract: **Background and Objective:** The present study was carried out to co-relate Hb A1C and NCV in diabetic and non-diabetic persons. **Material and method:** 90 subject were selected as the subject group, age group of the persons were selected was 20-60 years. NCV was carried out with evoked potential machine of standard company Nicolet. **Results:** A decrease in nerve conduction velocity with increase in Hb A1C, was observed. **Conclusion:** Hb A1C, was found highly significant with diabetic group of subjects then non-diabetic group of subjects.

Keywords: NCV, Hb A1C, Diabetic, non diabetic.

Introduction

Lifestyle, healthy diet exercise is a predictive medicine. Who estimate for the number of people with diabetes worldwide in 2000 as 177 million and likely to increase to 370 million by 2030. The major concerns are that much of this increase in diabetes will occur in developing countries due to populated growth, aging unhealthy diet, obesity and sedentary lifestyle.[1] Our study is of decrease in nerve conduction velocity in diabetes leading to diabetic neuropathy. Early recognition of altered nerve conduction velocity or blood sugar will be of great clinical, social and preventive major in diabetes. Diabetic neuropathy is also determined by Garry depending on location of damaged nerves, the body part of system, which is affected, type of nerve involved and the symptoms.[2]A key to treatment is glycemic control keeping glucose at normal or near normal levels will help lessen or even eliminate the symptoms of neuropathy. The present study has been undertaken to study the effect of HbA_1C levels and nerve conduction velocity. Measurement of HbA_1C has been useful in assessing diabetic control.[3,4]. Thus the use of electrophysiological studies are helpful in patients as nerve conduction velocity can be used as diagnostic tool for early detection of nerve damage leading to diabetic neuropathy.

Material and Methods

The present study was conducted in the department of physiology at MGM medical college Aurangabad, after obtaining the approval of the research and ethical committee of MGM college Aurangabad work was carried out. The present study was carried out in 100 subjects. 90 subjects, out of which 30 non-diabetic, 30 diabetic(controlled blood sugar), 30 diabetic(uncontrolled blood sugar were enrolled, 10 were excluded due to exclusion criteria terminally ill patients, patients suffering from neurological diseases, malignancy, sever cardiac disease. Inform consent of patients was taken from subjects, procedure was explained and proper trial was given before taking the reading. In each subject's age, weight, height was recorded. The subjects were divided into three groups. Nerve conduction study was carried out by evoked potential machine nicolet.[5] For median and ulnar nerve conduction velocity, first the thinner area and the skin over line, the elbow enriched is cleaned using the conducting paste, the recording electrode is placed closed to the motor point, reference electrode, distal to it, the ground electrode is proximal to recording electrode. The electrodes are connected to oscilloscope through amplifier, then with the stimulating electrode a stimulation is given at one point (wrist).The conduction time for evoked potential (recorded on the screen) is latency 1, again the nerve is stimulates at second point (elbow), the conduction time taken for evoked potential (recorded on the screen) is latency 2. The distance between the two simulated point was measured and nerve conduction study is calculated by distance divided by latency difference[5]. Hb A^1C was estimated by Nycocard method. Hb A1C also known as glycosylated Hb is a good general major of diabetes. The Hb A1C indicates a person's average glucose level over the past 3 months. Parameter studied were NCV and Hb A1C. Data was analyzed by Microsoft excel software for significant difference using unpaired "t-test"

Results

Parameter studied were NCV and Hb A1C.

Table 1: Mean and SD of Hb A1C in Diabetics and Non- diabetics

Sr. No	Group	Mean Hb A1C	SD
1	Diabetics (Control)	7.62	0.76
2	Diabetics (uncontrolled)	10.33	0.176
3	Non-diabetics	5.79	0.55

Table 2: Comparison between diabetics (control blood glucose level) diabetics (Uncontrolled blood glucose level) and non- diabetics in Hb A1C.

Sr No	Comparison	t-value	p-value	Significance
1	Control Hb A1C v/s uncontrolled Hb A1C.	-19.08	0.00001	Highly significant
2	Control Hb A1C v/s non diabetics Hb A1C.	10.154	0.0001	Highly significant
3	Uncontrolled Hb A1C v/s non diabetics Hb A1C	44.41	0.0001	Highly significant

Table 3: Mean and SD of diabetics and non diabetics in median(mixed) NCV (mt/s).

Group	Motor mean	NCV (mt/s) SD	Sensory mean	NCV SD
Non diabetics	61.4	2.53	59.60	2.69
Diabetics	53.42	3.64	54	3.01
Diabetics(uncontrolled)	40.93	2.42	41.2	1.31

Table 4: Mean and SD of diabetics in ulnar (Motor and sensory) NCV mt/sec.

Sr. No	Groups	Motor NCV (mt/sec) Mean	SD	Sensory NCV mt/sec Mean	SD
1	Non diabetics	61.3	3.15	58.86	3.63
2	Diabetics (controlled	51.55	4.07	57.56	2.05
3	Diabetics (uncontrolled)	42.9	2.76	42.13	1.90

Discussion

Our Results show that NCV is significantly reduced in both diabetic (control blood glucose) and diabetics (Uncontrolled blood glucose level). Our study shows that HbA1C is significantly increased in diabetic groups. The nerve conduction velocity of median (motors and sensory) is found decreased in diabetic group of patients. The nerve conduction velocity of ulnar(motor sensory) was found decreased in diabetic groups of patients compared to non diabetic group of patients. Our study matches with Mc Donald M.J.[6] *et al* (1978). Dolhofer[7] *et al* (1977), Bunn H.F[8]. *et al* (2007), watanabe[9] *et al* (2009), Asad[10] *et al* (2009) rajaballay[11] *et al* (2009) showing significant reduction in nerve conduction velocity in diabetics as compared to non diabetics. This might be due to excess glucose overloads causing the electron transport chain to produce superoxides and subsequent mitochondrial cytosolic oxidative stress.[12] Defect in metabolic and vascular pathways intersect with oxidative stress to produce the onset and progression of nerve injury. HbA1C compromises 4-6% Hb in normal erythrocytes and is elevated approximately twofold in diabetes[7]. Among the above parameters i.e. Nerve conduction velocity and HbA1C (Glycosylated Hb) will detect early deteriotion of neuropathy. Thus in our study significant reduction in NCV in both diabetics (control and uncontrolled glucose level) is in correlation with HbA1C.

Conclusion

Diabetic neuropathy is seen in persons with increased HbA1C. Along with the electrophysiological study, estimation of glucosylated Hb indicates glucose level of past few months for early detection of unset progression of nerve injury.

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