Study of NCV of Motor Nerves in Diabetes

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Research Article

Abstract: **Objectives:** The present study was carried out to measure the NCV in diabetic and non diabetic persons. **Material 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 Blood glucose level was observed. **Conclusion:** NCV was found statistically highly significant in peronealandtibial motor nerves of diabetic and non diabetic group of patients.

Keywords: NCV, Peroneal nerve, Tibial nerve, diabetics.

Introduction

Life in modern society is complex and often tension filled hour by hour, day by day, the automatic nervous system is mobilized to help us to deal with the interpersonal and impersonal stresses we encounter resulting in several diseases like diabetes, hypertension and psychosis.In prolonged uncontrolled diabetes peripheral nerves are seen to be affected. Diabetes is a metabolic disorder characterized by high blood glucose level due to deficiency of insulin. In developed countries most people with diabetes are above the age of retirement. In developing countries those most frequently affected are in middle productive years of their lives, aged between 45 and 64years[1]. Decrease of forearm median motor conduction velocity also in carpel tunnel syndrome is due to retrograde conduction slowing.[2] In type 1 diabetes neuropathy occurs after many years of poorly controlled blood glucose, symptoms go unnoticed at first but overtime they become more severe. In type 2 diabetes symptoms of neuropathy usually appear more quickly and may be present at the time of diagnosis, risk factors and potential causes diabetic neuropathy have shown that several factors contribute to the disorders, high level of blood glucose contribute to chronic nerve damage, the extra sugar in the body appears to react chemically with the nerves or cells around the nerves.EMG is used to check the response of muscles to electrical impulses when transmitted through the nerves. Nerve conduction studies check the flow of electric current through a nerve and increase or decrease in response of impulse transmission indicates nerve damage[3]. Thus neuropathy refers to disorders of nerves; there are many causes of neuropathy, one of which is diabetes as having diabetes for many years with prolonged high blood glucose increases the risk[4]. The present study has been undertaken to study the effect of blood sugar on nerve conduction velocity. Thus a nerve conduction study is a test commonly used to evaluate the function, especially the ability of electrical conduction of motor and sensory nerves of human body.[5]

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 MGMCollege 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, severe 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, heights were recorded. The subjects were divided into three groups nerve conduction study was carried out by evoked potential machine Nicolet.Blood sugar estimation was done by glucose oxidase /paraoxidase method. Parameters studied where blood sugar and NCV. Data was analyzed by Microsoft excel software for significant difference using unpaired t-test.

Results

Table 1: Mean and SD of diabetics (controlled blood glucose level), diabetics (uncontrolled blood glucose level) and non-diabetics in peronial NCV (mt/s).

Serial no	Groups	Peronial NerveNCV (mt/s)	
		Mean	SD
1	Non diabetics	52.66	3.18
2	Diabetics(controlled)	44.13	2.75
3	Diabetics(uncontrolled	32.86	2.53

Table 2: Mean and SD of diabetics(control) diabetics (uncontrolled) and Non diabetics in tibial NCV (mt/s).

Serial no.	Groups	Tibial Nerve NCVmt/s	
		Mean	SD
1	Non diabetics	52.76	3.35
2	Diabetics (control)	46.11	4.11
3	Diabetics (uncontrolled)	35.5	1.91

Table 3: Comparison betweendiabetics(control blood glucose level), diabetics-
(uncontrolled blood glucose level) andNon diabetics in peronial (motor).NCV mt/s.

Serial No.	Comparison	t-value	p-value	Significance
1	Non diabetics peronial v/s control peronial	11.1	0.00001	Highly significant
2	Non diabetics peronial v/s uncontrolled peronial	26.50	0.0001	Highly significant
3	Control peronial v/s uncontrolled peronial	16.5	0.0011	Highly significant

Table 4: Comparison Between diabetics (control blood glucose level) diabetics (uncontrolled)
and non diabetics in tibial (motor) NCV mt/s.

Serial no	Comparison	t-value	p-value	Significance
1	Non diabetics tibial v/s controlled tibial	11.0	0.00001	Highly significant
2	Non diabetics Tibial v/s uncontrolled tibial	25.4	0.0001	Highly significant
3	Controlled Tibial v/s uncontrolled tibial	14.2	0.0001	Highly significant

Discussion

Our study shows that the nerve conduction velocity of peronial and tibial nerve was decreased in diabetic group of patients compared to non diabetic group of patients andmatches with findings of Tomlinson[6]*et al* (2008), Bertoluci[7]*et al* (2008), Edwards[8]*et al* (2008),which show NCV significantly decreased in motor nerves of diabetics as compared to non diabetics. This shows that diabetic neuropathy to be multifactorial process, polyal pathway, extra glucose is shunted into polyal pathway and converted to sorbitol and fructose by enzymes aldose reductase and sorbitol dehydrogenase, accumulation of sorbitol and fructose leads to myosiotol, decreased membrane Na^+ ,K^+ ATPase activity, impaired axonal transport and structural breakdown of nerves.[7]Thus diabetic neuropathy is a nerve disorder caused by diabetic mellitus. It may be diffuse, affecting several parts of the body, or focal affecting a specific nerve. It refers to a group of nerve disorders caused by diabetes throughout the body, although it most commonly affects nerves in hands and feet[9]**.** Motor symptoms may be fine hand co-ordination, difficulty in climbing up and down stairs, difficulty getting up from a seated or supine position, difficulty in raising the arms above the shoulders[10]. Among the above parameters i.e. NCV and blood sugar will detect early deteriotion of neuropathy. Thus in our study significant reduction of NCV of motor nerves in diabetics is due to increased blood glucose level.

Conclusion

Diabetic neuropathy is seen in motor nerves due to increased blood sugar level affecting NCV in Diabetics. Thus the use of electrophysiological studies like nerve conduction studies are helpful in patients, as nerve conduction velocity can be used as the diagnostic tool for early detection of nerve damage leading to diabetic neuropathy which can be prevented if diagnosed earlier.

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