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Diabetic Neuropathy And Its Correlation With Vitamin D_3

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Abstract: The purpose of this study was to determine neurotransmitter and vitamin D3 levels in both men and women. Fifty healthy middle-aged men and women of 41.17 ± 9.6 and 42 ± 9.59 years respectively were selected. They have no known disease. While 50 male and female diabetic patients with an average age of 55.5 ± 14.92 and 47.87 ± 10.81 years were selected respectively. Anthropological data, including age, weight and length, were recorded in both controls and patients. To test the hypothesis of study relationship between vitamin D and neurotransmitters was analyzed in both groups. The statistical significance was taken at the p-level <0.05. The diabetic patients had neuropathy for 3 to 5 years with high HbA1c. Age and gender do not significantly affect neuropathy in diabetes. The average standard deviation of vitamin D3 is significantly lower in those having diabetic neuropathies, 12,448 ± 3,519 ng / ml (SD), which is not 24,958 ± 5,419 ng / ml, and was compared with vitamin D3 neuropathy in patients who did not have diabetes. (p <0.01). This analysis has shown that the neuropathy of diabetes is strongly linked to vitamin D3 after including confusion such as "Duration of diabetes and HbA1c". In patients with diabetes, the effects of vitamin D3 on neuropathy and the need for further studies ensure that there is a delay in preventing the dose of vitamin D3 or in the onset of neuropathy due to diabetes

Keywords: Type 2 Diabetes mellitus, Vitamin D3, Diabetic neuropathy, HbA1c

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INTRODUCTION:

Diabetic neuropathy influences neurons of the fringe sensory system as well as tangible, autonomic neurons leaving it powerless [1]. Other than this, each organ framework in the body that depends on innervations for capacity is therefore subject to pathology [1]. Consequently diabetic neuropathy portrays various unmistakable disorders that are for the most part arranged by the nerve strands influenced. Concerning the malady course, it is blessed that just a minority of patients experience neuropathic agony yet terrible that a lion's share don't report side effects until the difficulties are extreme [1].

Pervasiveness information for Diabetic Autonomic Neuropathy (DAN) range from 1.6 to 90% contingent upon tests utilized, populaces inspected, sort and phase of sickness. Danger components for the advancement of DAN incorporate diabetes' length of time, age, and Long-term regulation of low blood sugar. Large pots can be separated by elements of events such as high pulses and dyslientemia. High glycemic control, fat control and blood pressure regulation may be important in the interactive DNA process. Many years of exploration clarifying that the patho-physiology of diabetic neuropathy has been fizzled, in this manner there is a critical need to create a treatment that anticipates or switches its improvement and movement [2]. As of late, various contending or parallel obsessive pathways have started to cross and supplement one another, lighting up potential pharmacologic targets. The ebb and flow center of diabetic neuropathy exploration are oxidative anxiety, propelled glycation deciding items, that is, Advanced Glycation End Products (AGEs), protein C kinase (PKC) and the polyol pathway [2]. In 1986, an important part of vitamin D in the endocrine pancreas was identified; essentially, inadequate vitamin D has been shown to secrete insulin in the pancreas [3]. Scientists have discovered that the relationship between vitamin D and diabetes is detected in the future by vitamin D, vitamin D receptor (VDR), atomic pancreatic tissue, visual explanation, and the ability to respond to the future of vitamin D [4]. Data from different countries, such as South India, Germany and Taiwan, have been shown to be related to polymorphism of vitamin D receptors and type 1 diabetes [5, 6, 7]. DBP and VDR polymorphism is related to glucose capacity and the severity of type 2 diabetes with age, lifestyle and diversity [8]. VDR gene is located on chromosome 12q13.11 and consists of 11 exons. Most VDR polymorphisms [9], in several forms of relationship between several observational studies reported an effect on glucose insulin and calcitriol levels [10]. A study confirmed that T2D patients with AA genotype had slightly higher plasma glucose levels and those having Aa and AA mutants, but were non-diabetics had significantly higher plasma glucose levels which was associated with insulin resistance [11].

MATERIALS AND METHOD

A. Patients and Method

A cross sectional study approved by ethics committee of Baqai Medical University, was done in the Department of Physiology at Baqai Medical College and affiliated Baqai Hospitals (Fatima & North Nazimabad), Karachi and Jinnah Postgraduate Medical Centre, Karachi. Duration of the study was from August 2014 to March 2015. The study included 50 patients (Males & females) with mean ages 55.5±14.92 and 47.87±10.81 years respectively and 50 normal subjects (males and females) with mean ages 41.17±9.66 and 42±9.59 years respectively. The information regarding name, age, sex, height (centimeter) and weight (kg) was filled on a consented questionnaire. Nerve conduction velocity was measured on both groups and data of Vitamin D_3 and HbA1c was compared with NCV.

B. HbA1c

After Venipuncture blood was collected in Potassium EDTA, Ammonium Heparin or Lithium Heparin anticoagulants tubes**.** The determination of HbA1c is based on a latex agglutination inhibition assay (Kit Randox Laboratories Limited). The agglutinator has an artificial polymer that contains several copies of the HbA1c's immune molecule, which causes the latex binding of monoclonal antibody in the mouse HBA1c [12]. The appearance of HbA1c in the sample will slow down the stacking rate because it competes with the HbA1C integrator for antibody binding sites on latex. The percentage HbA1c is then calculated using the g/dl HbA1c and Total Hemoglobin values [13].

C. Nerve conduction velocity

The motor nerve conduction study, a mixed nerve containing motor and sensory axons is stimulated at a given site along its course. The stimulus is a brief electrical pulse which will induce a sufficient depolarization in all the axons under this site to generate action potentials [14]. The evoked potentials in motor axons will travel in distal and proximal directions from the stimulus site. The action potentials travelling towards the muscle innervated by that nerve will reach the neuromuscular synapses after some milliseconds and will induce their neuromuscular transmission and eventually action potentials along the muscle fibers. The summation of these muscle fiber action potentials is recorded by surface electrodes placed on the skin over the muscle and is known as compound muscle action potential (CMAP) [15]. The onset latency of the CMAP reflects the conduction time along the fastest conducting axons of the nerve. When the nerve is stimulated at increasing distances from the muscle (e.g. wrist, elbow, axilla, and Erb's point), CMAPs of increasing latencies are recorded. The amplitude and area of the CMAP reflect the number of muscle fiber action potentials and therefore indirectly, the number of axons which can be stimulated [16]. However, as in nerve pathology some axons may be affected whereas other axons are normal, it is more convenient to describe the CMAP as the summation of motor unit action potentials (MUPs) rather than as the summation of muscle fiber action potentials. A MUP is the summation of the muscle fiber action potentials of one motor unit. A motor unit is one motor neuron, including its axon, and the muscle fibers it innervates [17].

Nerve Conduction Velocity = D (meters)/ Tc (sec)

Where,
D= distance
Tc= conduction time

Nerve conduction velocity was measured in Motor nerves which include Median nerve, Ulnar Nerve, Tibial Nerve and Peroneal nerve and sensory nerves including Radial Nerve, Ulnar Nerve and Sural nerve.

D. Vitamin D

Enzyme Linked Immunosorbent Assay was done on microtiter plates. The required numbers of strips were selected to run ELISA kit. The unused strips were resealed in the bag with a desiccant and stored at 2-8°C [18]. 50 µl of each Calibrator, Control and Sample were pipetted into the appropriate wells

[19]. 150 µl of incubation buffer was pipetted into all wells. The absorbance at 450 nm (reference filter 630 nm or 650 nm) within 1 hour was calculated [20, 21].

E. Data Analysis

Significant portfolios and issues in the compiled forum have been impeded by all those involved and the program has been approved by the SPSS 22.0 program. Normal meanings and genital disorders (SD) are calculated for constant changes such as age, height, weight loss and BMI for hypertension (illness and disease). In attempting to test the neurotransmitter, fluid variations have been changed between the specific parts of the D3 and HbA1C Dioxidal products. In trying to justify the purpose of education, the solution is used to determine the relationship between the D and neurotransmitter cells for the two in pairs. P <0.05 was uploaded.

I. RESULTS AND DISCUSSION

Often used to talk about the effects of neuropathy on Conductivity velocity (NCV), DL amplitude (AMV), acute and nocturnal compression, fast and rapid intensity of the sensory nervous system are all calculated by PowerLab in this study. Before Shehab's experiment, he reported that the movement speed of the MNCV was the first symptom of the disease [22], whereas before the usual effect, as well as with the often reaction, acne is too high [23]. The current part of the time is associated with a cone hologram (NCV), the lines and the effect of vitamin D3 on the diagnosis of diabetes. For the most common diagnosis, HbA1c was diagnosed with normal people and people with diabetes, as described in Table I.
In order to find the relationship of HbA1c with Vitamin D3 [24]. Fourth activity in diabetic HbA1c which is highly influenced; is achieved. The p-value was highly significant in patients with neuropathy. Table II and IV depicts the differences.

TABLE I. Blood glucose levels hba1c and vitamin D_3 levels in control and patients.

Group	N	Mean	Std. Deviation	Std. Error Mean	P-value
Blood Glucose Control level (RBS) mg/dl	50	1.0298E2	14.56511	2.05982	<0.01
Patient	50	2.1796E2	70.98087	10.03821	
HbA1c (%) Control	50	5.0480	.40670	.05752	<0.02
Patient	50	7.3940	1.09422	.15475	
Vitamin D_3 level Control ng/ml	50	24.9580	5.41397	.76565	<0.01
Patient	50	12.4480	3.51970	.49776	

TABLE II. Sensory nerve conduction measurement in right and left side of the control.

Nerves	Right side		
	D.L	AMPT	NCV
Median Nerve	3.678±0.558	18.04±10.499	52.82±5.630
Ulnar Nerve	4.642±1.192	9.216±5.180	51.9±2.830
Sural Nerve	3.224±0.502	10.92±3.683	48.66±3.280

Nerves	Left side		
	D.L	AMPT	NCV
Median Nerve	3.022±0.585	16.364±10.257	51.62±3.730
Ulnar Nerve	4.4±1.208	8.766±5.202	51.14±3.276
Sural Nerve	3.1±0.416	10.736±3.180	48.6±2.864

Likewise, a significant decrease in nerve conduction velocity (NCV) was observed in controls / normal subjects [28]. There is no correlation between the age and diabetes [29].–Obviously, a 10% slowdown has been reported. This study has shown that serum 25 (OH) vitamin D3 is significantly different in diabetic patients and without peripheral neuropathy as shown in the tables in III and V. Several studies separately examined the role of each of these factors, diabetic neuropathy. The vitamin D3 deficiency is common in patients with diabetes mellitus. Soderstrom (2012) and colleagues studied the role of vitamin D3 in diabetic neuropathy. The lack of vitamin D3 in 591 diabetic patients associated with peripheral neuropathy [30]. In patients with diabetic neuropathy, reduction in the speed of message relaying activity to the brain is observed. The speed of motor nerve reduces in diabetic patients with time and uncontrolled diabetes mellitus… Obviously, a 10% glow down has been reported. In this study, the duration of illness in men and women with diabetes significantly differs. Age has no significant difference among men and women in diseased condition

TABLE III. Motor nerve conduction measurement in right and left side of the control.

Nerves	Left			
	D.L	AMPT	NCS	F.L
Median nerve	4.006 ±0.685	24.052 ±14.103	49.606 ±4.955	42.18 ±6.793
Ulnar nerve	4.916 ±1.167	7.736 ±4.283	51.18 ±2.264	51.13 ±0.604
Peroneal Nerve	5.502 ±0.687	3.492 ±0.639	47.48 ±3.271	64.96 ±4.070
Tibial Nerve	5.192 ±0.631	7.356 ±1.282	42.98 ±4.888	67.266 ±7.580

Nerves	Right			
	D.L	AMPT	NCS	F.L
Median nerve	4.092 ±0.713	24.502 ±14.562	51.11 ±4.630	42.22 ±5.388
Ulnar nerve	4.976 ±1.010	7.79 ±4.516	51.48 ±2.287	51.32 ±13.459
Peroneal Nerve	5.766 ±0.599	3.75 ±0.533	47.08 ±3.433	65.14 ±4.379
Tibial Nerve	5.488 ±0.498	7.634 ±1.257	43.78 ±4.995	68.126 ±7.520

Determining the Infringement by Monophilment Sem Weinstein [31] is a "self-report" report. In our study, research design was applied and NSS-NDS criteria and electronic tests were used as the minimum criteria for DPN diagnosis [32]. In this study, we found a relationship between vitamin D3 and DN. Test

TABLE IV. Sensory nerve conduction measurement in right and left side of patients.

Nerves	Right side		
	D.L	AMPT	NCV
Median Nerve	2.91±0.612	22.926±12.13	50.78±2.418
Ulnar Nerve	2.832±0.541	10.402±2.1	51.38±1.455
Sural Nerve	2.456±0.374	9.402±4.141	46.58±3.569

Nerves	Left side		
	D.L	AMPT	NCV
Median Nerve	8.12±38.372	22.712±12.122	48.52±1.63
Ulnar Nerve	2.614±0.478	9.92±2.33	48.42±1.444
Sural Nerve	2.33±0.292	9.04±3.987	44±3.635

The neuropathy in diabetic patients must have different ways to test the impact of Vitamin D3 tried to change neuropathy in the patients [33]. There were certain limitations in our study. At the end of the test, this time the connection between neuropathy in diabetic patients with diseased state was expressed; but according to the results of the first study of diabetic neuropathy further studies must be conducted to decide the acceptance or rejection of the hypothesis. Normally the duration of the disease and the diabetes affects HbA1c. However, no difference between genders was observed regarding the disease. The reduction in the speed of message relaying activity of diabetic patients occurs due to impairment of nerve conduction velocity.

TABLE V. Motor nerve conduction measurement in right and left side of patients.

Nerves	Right			
	D.L	AMPT	NCS	F.L
Median nerve	2.92 ±0.61	10.46 ±2.45	41.44 ±14.47	32.92 ±8.96
Ulnar nerve	3.22 ±1.14	9.88 ±3.14	39.46 ±14.84	36.02 ±7.30
Peroneal Nerve	4.48 ±1.41	2.32 ±1.01	44.79 ±3.22	62.68 ±5.26
Tibial Nerve	4.59 ±0.98	6.14 ±2.24	37.46 ±5.44	63.56 ±13.17

	Left			
	D.L	AMPT	NCS	F.L
Median nerve	2.70 ±0.52	10.94 ±4.07	39.18 ±13.88	31.14 ±9.63
Ulnar nerve	3.01 ±1.07	9.59 ±3.07	37 ±14.27	33.44 ±8.49
Peroneal Nerve	4.24 ±1.34	2.17 ±0.88	43.02 ±3.63	59.15 ±5.88
Tibial Nerve	4.96 ±4.16	5.86 ±2.26	35.10 ±5.57	60.82 ±13.14

CONCLUSION

The relationship between the deficiency of Vitamin D3 and diabetic neuropathy is assessed in present study. The verification of the signal confirms the significance of Vitamin D3 in neuropathy but, assessment of Vitamin D3 deficiency and diabetic neuropathy can provide prior assistance regarding human health.

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