THE RELATIONSHIP BETWEEN VASCULAR ENDOTHELIAL GROWTH FACTOR-A SERUM LEVEL AND THE SEVERITY OF DIABETIC PERIPHERAL NEUROPATHY

Talaat Abdelfatah Abdelaty, Mai Hesham Mohammed Badrah, Salma Alaa Eldin Mostafa Imbaby,* Yousra Hisham Abdel Fattah, Walid Mohamed Silim**

Department of Internal Medicine, Clinical and Chemical Pathology,* Physical Medicine, Rheumatology and Rehabilitation, Faculty of Medicine, Alexandria University**

Introduction

Diabetes mellitus causes a broad array of neuropathic complications affecting the peripheral nerves at different locations from the root to the distal axon. It involves sensory, motor and autonomic nerves. Distal symmetric polyneuropathy is recognized as the most common form with pain reported as the chief symptom. So far, tight glycemic control is the only approved treatment that halts progression of neuropathy.

The mechanism of nerve injury in diabetes mellitus is believed to be accounted for by multiple factors including metabolic aberrations and vascular compromise. Increase in polyol flux, accumulation of advanced glycation end-products, oxidative stress and activation of protein kinase C are thought to be the key drivers in the pathophysiology of neuropathy. Recent studies have attempted to study the role of depletion of neurotrophic factors such as VEGF in the development of diabetic peripheral neuropathy (DPN). Study of these pathophysiologic changes is vital in the quest to find treatment.

Vascular endothelial growth factor (VEGF) is a potent cytokine for endothelial cells and is usually released in response to hypoxia. It promotes angiogenesis and development of collateral vessels in tissues undergoing ischemic changes. It has been strongly implicated in the development of diabetic retinopathy and has been associated with glomerular changes in diabetic nephropathy. Very little information is available regarding the role of VEGF in diabetic neuropathy. Studies have shown that it can be both a pathogenic factor and also a protective factor in diabetic neuropathy.

Aim of the work

The aim of the present study was to demonstrate the relationship between serum VEGF-A levels and the severity of DPN.

Subjects and Methods

A cross-sectional study was conducted on 81 patients with diabetes mellitus. All participants were subjected to full history and physical examination. Electromyography was used to diagnose and stage neuropathy. 14 patients had no neuropathy, 24 had mild neuropathy, 33 had moderate neuropathy and 10 patients were classified as having severe neuropathy. Serum levels of VEGF-A were measured. Additionally, glycemic control, blood pressure, total cholesterol and BMI were some recorded parameters.

Results

Table 1: Relation between VEGFR and neuropathy assessment (n = 81).

	N	VEGFR			Test of Sig.	p
		Min. – Max.	Mean ± SD.	Median		
Electrophysiologic score					t= 1.836	0.070
Normal	14	104.20 – 333.20	247.94 ± 60.47	248.15		
With neuropathy	67	107.20 – 336.10	219.42 ± 51.22	222.60		
Normal	14	104.20 – 333.20	247.94[a] ± 60.47	248.15	F= 18.438*	<0.001*
Mild	24	166.10 – 336.10	250.38[a] ± 45.78	238.65		
Moderate	33	161.20 – 288.70	221.10[a] ± 32.66	222.60		
Severe	10	107.20 – 178.70	139.61[b] ± 21.19	139.50		
Combined score					t= 1.254	0.214
Normal	13	104.20 – 326.60	241.38 ± 57.52	245.30		
With neuropathy	68	107.20 – 336.10	221.10 ± 52.68	222.60		
Normal	13	104.20 – 326.60	241.38[a] ± 57.52	245.30	F= 10.443	<0.001*
Subclinical	30	166.10 – 336.10	249.76[a] ± 47.71	246.25		
Confirmed	38	107.20 – 288.70	198.47[b] ± 45.26	210.20		
Toronto score					F= 6.938*	<0.001*
Normal (0 – 5)	46	104.20 – 336.10	243.56 ± 51.10	241.05		
Mild (6 – 8)	17	136.70 – 288.70	212.60 ± 42.0	215.90		
Moderate (9 – 11)	12	107.20 – 262.30	196.43 ± 46.01	202.10		
Severe (12 – 19)	6	115.90 – 238.70	166.20 ± 49.27	155.85		
VPT					t= 3.916	<0.001*
<25 (no neuropathy)	60	104.20 – 336.10	237.07 ± 49.41	236.30		
≥25 (with neuropathy)	21	107.20 – 266.10	188.02 ± 49.32	203.60		

SD: Standard deviation t: Student t-test
F: F for ANOVA test, Pairwise comparison bet. each 2 groups was done using Post Hoc Test (Tukey)
p: p value for comparing between the different categories *: Statistically significant at $p \leq 0.05$
Means with Common letters are not significant (i.e. Means with Different letters are significant)

Table 2: Correlation between VEGF and laboratory investigations (n = 81).

	VEGFR	
	r_s	p
HbA1c	-0.417	<0.001*
Creatinine	-0.391	<0.001*
Total Cholesterol	-0.278	0.012*

r_s: Spearman coefficient
*: Statistically significant at $p \leq 0.05$

Conclusion

- From the results of the present study, we can conclude that there was significant negative correlation between levels of VEGF-A and the degree of diabetic neuropathy. Additionally, we found significantly low levels of VEGF-A in patients with advanced neuropathy.
- Furthermore, negative correlations were observed between serum VEGF-A and the following parameters: glycemic control, total cholesterol and serum creatinine.