The Association Between the Severity of Diabetic Peripheral Neuropathy and Diabetic Risk Factors in Diabetic Patients Type I and II.

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Abstract

Back ground: The diabetic risk factors can effect on the severity of diabetic peripheral neuropathy (DPN). The most risk factors have an effect on the peripheral nervous system are duration of diabetic disease, glycocelated hemoglobin (HbA1C) and type of diabetes (DM type). Objectives: To determine the association between severity of DPN and duration of diabetes, HbA1C, the type of diabetes, age and sex of diabetic type I and II patients. Patients and Methods: Three hundred individuals were participated in cross sectional study. They divided to two groups labeled as A and B. Group A regarded as diabetic patients with abnormal neurological examination. Group B regarded as diabetic patients with normal neurological examination. About 68 male and 82 female were participated in this study for each group. The age of participant are grouped as <18, 18-30 and 31-60 year. The full history was taking from participants including socio demographic data and duration of disease with type of diabetes. All participants with type I and II underwent clinical assessment and biochemical investigation. The clinical assessment used Toronto clinical scoring system (TCSS) for screening diabetic peripheral neuropathy (DPN). The biochemical investigation was done for determining the level of HbA1C. The study was carried out at Marjan teaching hospital and Al Sadeq teaching hospital in Babylon province during the period from Aug.2017 to Sep.2018.Results:TCSS used for scoring the DPN to mild, moderate and severe. The severity of DPN show significant association with duration of DM disease, type of diabetes , the level of HbA1C and age of diabetic patients, the P value about o.oo1, 0.02 , 0.001 and 0.001respectively. The sex of diabetic patients showed no significant association with severity of DPN, the P value 0.45.Conclusions: There is higly association between severity of DPN and DM duration, HbA1C , type of DM and age of diabetic patients. There is no association between sex of diabetic patients and severity of DPN.

Introduction

Diabetes Mellitus (DM) is a clinical syndrome characterized by hyperglycemia due to absolute or relative insulin deficiency [1]. The long term complications of DM developed gradually. The long duration of DM and uncontrolled DM has higher risk for developing DM complication. The complication of DM can be listed as Microvascular and Macrovascular complication. The most common Microvascular complication is DPN [2].

The DPN can be presented as slowly progressive in a length dependent fashion (evoking the classic stocking glove distribution) according to [3]. The sign and symptoms of DPN can be varied according to nerve fiber involved. So when large fiber affected the proprioception and light touch will be impaired, but in case of small fiber involved, it can lead to paresthesias, dysesthesias, and/or neuropathic pain [4].

Patients and Methods

Three hundred individuals were participated in cross sectional study. They divided to two groups labeled as A and B. Group A regarded as diabetic patients with abnormal neurological examination.

Group G regarded as diabetic patients with normal neurological examination. About 68 male and 82 female were participated in this study for each group.

The age group are set as <18, 18-30 and 31-60 year. The full history was taking from participants including socio demographic data and duration of disease with type of diabetes. All participants with type I and II underwent clinical assessment and biochemical investigation. The clinical assessment used Toronto clinical scoring system (TCSS) for screening diabetic peripheral neuropathy (DPN). The biochemical investigation was done for determining the level of HbA1C. The study was carried out at Marjan teaching hospital and Al Sadeq teaching hospital in Babylon province during the period from Aug.2017 to Sep.2018. The DPN can be diagnosed by neurological examination. The grading severity of DPN can be assessed by TCSS, which can be graded the DPN to mild, moderate and severe. The following table shows the TCSS items.

Table 1: TCSS items

TCSS items		Description
Symptoms score	Pain	0 = absent, 1 = present
	Numbness	0 = absent, 1 = present
	Tingling	0 = absent, 1 = present
	Weakness	0 = absent, 1 = present
	Ataxia	0 = absent, 1 = present
	Upper-limb symptoms	0 = absent, 1 = present
Reflex score	Knee reflexes	Score for each side: 0 = normal, 1 = reduced, 2 = absent
	Ankle reflexes	Score for each side: 0 = normal, 1 = reduced, 2 = absent
Sensory test score	Pinprick	0 = normal, 1 = abnormal
	Temperature	0 = normal, 1 = abnormal
	Light touch	0 = normal, 1 = abnormal
	Vibration sense	0 = normal, 1 = abnormal
	Position sense	0 = normal, 1 = abnormal

So the scoring system can be summarized as:

- Zero to five points, without DPN.

- Six to eight points, mild DPN.

- Nine to eleven points, moderate DPN.

- Twelve to nineteen points, severe DPN.

Results

The results of study groups were analyzed. In Figure (1) below showed the distrebution of study group according to DM types. The Patients with DM type II more than patients with type I.
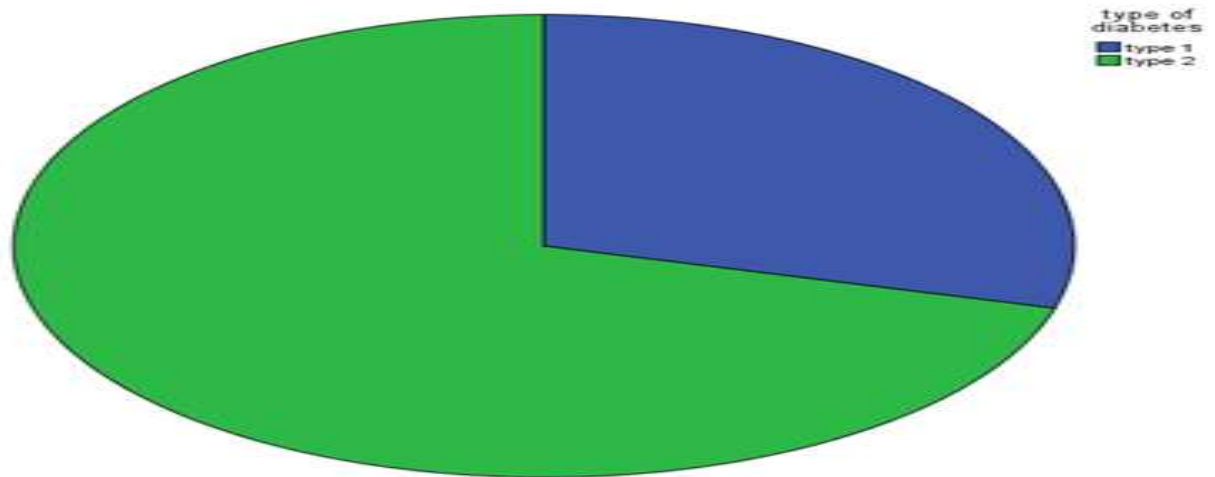
Figure 1: The distrebution of study group according to DM types

In Figure (2) below showed the distrebution of study group according to sex.

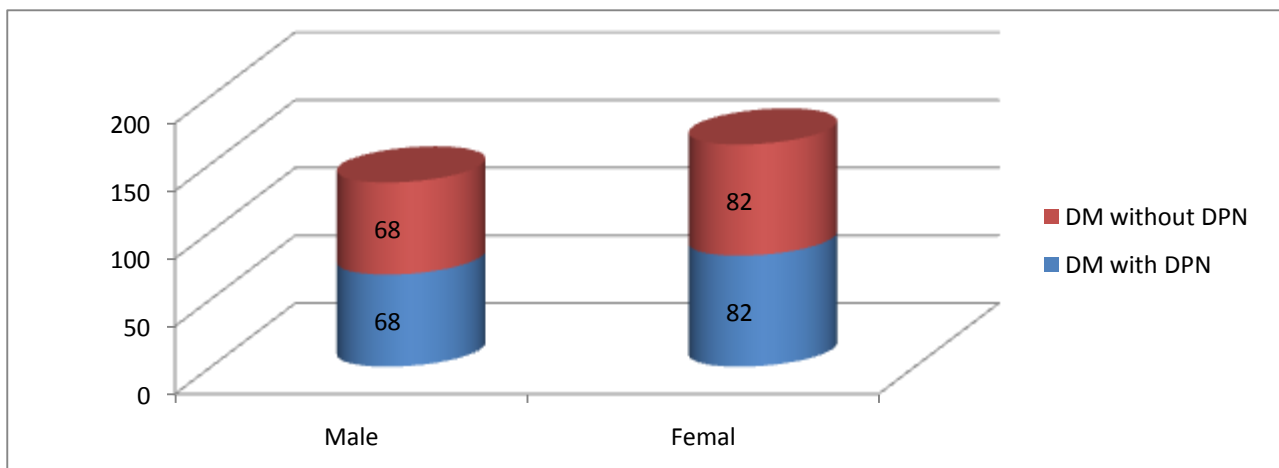The female DM patients more than male DM patients.

Figure 2: The distrebution of study group according to sex

In Table (2) below showed there is increased in mean of aged, duration of DM, HbA1C level and body mass index(BMI) with

significant P value in DM patients with DPN in compaire with DM patients without DPN .

Table 2: mean diffirences and SE of age, duration of DM, HbA1C level and BMI between DM patients with DPN and DM patients without DPN

DM risk factors	DM patients with DPN N=150	DM patients without DPN N=150	P value
	Mean ± SE	Mean± SE	
age	50.0±.0756	45.04±0.026	0.001
duration of diabetes in year	11.97±0.058	6.63±0.012	0.001
HbA1C in percentage	8.25±0.096	5.02±0.010	0.001
BMI	28.24±0.41	26.87± 0.28	0.001

BMI=body mass index

In Table (3) below showed there is significant correlation between age of DM patients with

DPN and the severity of DPN according to TCSS.

Table 3: correlation between age of DM patients with DPN and the severity of DPN according to TCSS

	TCSS scoring	>18	18-30	31-60	Total	P value
	mild	13(24%)	22(41%)	18(33%)	53	
	moderate	2(7.1%)	8(28.5%)	18(64.2%)	28	0.001
	severe	2(2.8%)	18(26%)	49(71%)	69	
Total		17	48	85	150	

In Table (4) below showed there is significant correlation between duration of DM patients

with DPN and severity of DPN according to TCSS.

Table 4: Correlation between duration of DM patients with DPN and severity of DPN according to TCSS

TCSS scoring		Duration group			Total	P value
		1-10	11-20	21-40		
	mild	40(75%)	11(21%)	2(4%)	53	
	moderate	9(32%)	18(64%)	1(4%)	28	0.001
	severe	18(26%)	40(58%)	11(16%)	69	
Total		67	69	14	150	

In Table (5) showed there is significant correlation between the type of DM in DM patients with DPN and the severity of DPN by TCSS.

Table 5: correlation between the type of DM in DM patients with DPN and the severity of DPN by TCSS

TCSS scoring		type of diabetes		Total	P value
		Type I	Type II		
	mild	23(43%)	30(56.6%)	53	
	moderate	4(14.2%)	24(85.7%)	28	0.012
	severe	17(24.6%)	52(75.3)	69	
Total		44	106	150	

In Table (6) below showed there is significant correlation between HbA1C level in DM patients with DPN and severity of DPN according to TCSS.

Table 6: Correlation between HbA1C level in DM patients with DPN and severity of DPN according to TCSS

TCSS scoring		HbA1C group			Total	P value
		5.8-6.4	6.5-7.5	7.6-20		
	mild	5(9%)	23(43%)	25(47%)	53	
	moderate	0	7(25%)	21(75%)	28	0.001
	severe	0	9(13%)	60(87%)	69	
Total		5	39	106	150	

In Table (7) belowed showed there is no significant correlation between sex of DM patients with DPN and severity of DPN by TCSS.

Table 7: The correlation between sex of DM patients with DPN and severity of DPN by TCSS

TCSS scoring		sex of participant		total	P value
		male	female		
	mild	21(39.6%)	32(60.3%)	53	
	moderate	12(42.8%)	16(57.1%)	28	0.45
	severe	35(50.7%)	34(49.2%)	69	
Total		68	82	150	

Disscusion

Most of participants are female (54.6%) and DM type II (70%). Male (45.4%) and DM type I (30%) are less frequent in our study as shown in Figure (1) and (2). The cause of these results may be due to female having improper glycemic control than male due to hormonal disturbance. This results show a good agreement with [5] that showed the prevalence of DM type II is about 90-95% from diagnosed cases and the prevalence of DM type I is about 5% from diagnosed cases.

As shown in Table (2) and Table (3) there is increased in mean of age of diabetic patients with DPN in comparing with DM patients without DPN. Also DPN is more severe in DM patients more than 30 year. This results may be due to the old age person normally have demyelinating process and the DM have demyelinating pathological process so two factors can aggravated the appearance of DPN [6, 7]. There is increased in mean of HbA1C level in DM patients with DPN In comparing with DM patient without DPN. Also the DPN is more severe in DM patients with HbA1C more than 7.5% as shown in Table (6). This results may be due to the HbA1C is an indicator for glycemic control so HbA1C variability may lead to microvascular complications of diabetes as impaired time-dependent glycemic control.

This results show an agreement with [8]. As shown in Table (2) and Table (4) there is increased in mean of duration of diabetes in patients with DPN in comparing with those free from DPN. Also the severity of DPN is

more severe in diabetic patients with prolonged duration of diabetes for more than 21 year with significant p value. This result is due to more duration time of diabetes lead to more diabetic complications including DPN. This result show highly agreement with [9, 10] who show that the initiating events of hyperglycemia, obesity, and dyslipidemia trigger increases in advanced glycation end products, chronic inflammation, oxidative stress, and mitochondrial dysfunction, which contribute to metabolic dysregulation.

So changes in any of these contributors to metabolic dysregulation are believed to alter neurotrophin expression and cause growth factor deficiency (including that of insulin) to influence nerve growth or regeneration, protection, and survival.

The cascade of events and associated microvascular complications result in the structural and physiological features of DPN, distal degeneration of peripheral axons, which leads to cutaneous denervation of the skin; diminished axonal regeneration; axonal atrophy; and myelin thinning, with slowed conduction velocity. The mean of BMI in DPN patients is more than those without DPN.

This result may be due to abdominal obesity, thick adipose tissue, low muscle mass and insulin resistance. This result shows agreement with [11, 12] who showed that the BMI is modifiable risk factor for developing DPN in diabetic type I and II patients. In Table (5) showed there is increase in DPN severity with type II DM patients in compare with type I patients with significant P value this result have grate agreement with [13, 14] who show that the DM type II patients prone to develop more severe degree of DPN.

This result may be due to the patients with type II DM are taking metformin as DM treatment which interact with absorption of Vit. B12. The low level of Vit.B12 may lead to demyelinating process which worsens the severity of DPN. At last the DPN severity shows no significant correlation with sex. This result agree with how show there is no significant between sex and severity of DPN When the p value is about o.47

Conclusions

There is higly association between severity of DPN and DM duration, HbA1C , type of DM and age of diabetic patients. There is no association between sex of diabetic patients and severity of DPN.

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