Original Article

Prevalence of peripheral neuropathy among patients with diabetes mellitus at King Hussein Hospital, Amman, Jordan

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Objective: To determine the prevalence of peripheral neuropathy (PN) among patients with Diabetes Mellitus (DM) at King Hussein hospital.

Methodology: This descriptive study was done at King Hussein Hospital, Amman, Jordan and included 202 patients od DM using convenience sampling technique. Data were collected through face-to-face interview. Data collection instrument is composed of two parts; the first part assessed the demographic characteristics, while the second part was a translated version of Michigan Neuropathy Screening Instrument (**MNSI**). Descriptive and inferential statistics were used for data analysis.

Results: Out of 202 patients, 102 were male and 100 female. The age ranged from 16 to 88 years (mean 56.19±14.31). The mean duration of diabetes was 10.69±8.24 years. The overall prevalence of PN was 54.45±49.92. The prevalence was higher in women than men (55±50 VS 53.92±50.09). There was significantly higher prevalence of PN among patients with non target glycosylated hemoglobin (HbAIc) ($p<0.05$), age ? 65 years ($p<0.05$), duration of diabetes ?10 years and body Mass index (BMI) ?25 kg/m2 ($p<0.05$).

Conclusion: The prevalence of peripheral neuropathy was high. Diabetic patient should be screened for PN continuously using simple instrument such MNSI. The initial measures that may help in prevention of PN were glycemic control and body weight control. (Rawal Med J 2013;38:92-96).

Key worlds: Diabetes mellitus, glycosylated hemoglobin, peripheral neuropathy.

INTRODUCTION

Diabetic peripheral neuropathy (DPN) is a nerve damage caused by diabetes; it may affect hands, arms, legs and feet. There will be a 69% increase in numbers of adults with diabetes in developing countries.[1] In 2011, there were 366 million people with diabetes and this figure is expected to rise to 552 million by 2030.[2] In 2004, approximately 400,000 (15%) Jordanian adults were reported to have diabetes (an increase from 7% in 1996), and an estimated 350,000 (12%) had impaired fasting glucose.[3] There is increased prevalence of type 2 diabetes in Jordan from 12.9% in 1994 to 17.4% in 2004.[4]

The prevalence of painful DPN in type 1 or 2 at Middle East Region was reported to be 53.7%.[5] The prevalence in Jordan is 57.5 %.[5] Diabetes and DPN may cause trauma that may lead to gangrene, amputation and increased morbidity and mortality. Early detection is necessary to increase awareness of the patients to initiate measures to prevent further damage, as increasing neuropathic impairment with significant loss of vibratory or pain sensation may make them unaware of burns or skin breaking injuries. The aim of the study was to determine the prevalence of DPN among patients with DM at our institution.

METHODOLOGY

This descriptive study was conducted at King Hussein hospital, one of the tertiary referral military hospitals of Royal Medical Services, Amman, Jordan from June 2011 to November 2011. The study recruited 202 out patients with DM by convenient sampling who were referred to our diabetes clinic.102 (50.5%) men and 100 (49.5%) women. Patients with type 1 or 2 DM, who agreed to participate, age 16 years or above, patients with no speech or hearing difficulties and those who had no amputation were included in the study. The study

was approved by the ethical committee of the Royal Medical Services in Jordan and informed consent was taken from all subjects.

Data were collected from participants via face to face interview and physical assessment for the legs was done by two of authors. Demographic data (gender, age, height, body weight , occupation, marital status, level of education, associated disease and type of treatment, period of diagnosis with DM, smoking and glycosylated hemoglobin (HbA1c) was collected. After this, the Arabic version of Michigan Neuropathy Screening Instrument (MNSI)[6] was used to evaluate DPN. To decrease the potential for bias, all scoring information has been eliminated from the patient version. The first part is designed to assess the presence of symptoms of peripheral neuropathy. The score ranges from 0 - 13 points. Higher score indicates more neuropathic symptoms. The second part of the MNSI is a brief physical examination involving: inspection of feet for deformities, dry skin, callous or infection, presence or absence of ulceration, tuning fork 128 Hg was used to examine vibration sensation, hammer reflex was used to examine ankle reflex and 10g monofilament was used to test sensation of feet. Any positive patients screening on the clinical portion of MNSI (greater than 2 point on a 10 point scale) was considered neuropathic and was referred for further evaluation.

Sample was divided according to gender, type and duration of DM, age, HbA1c, smoking, body mass index and level of education. Scores were calculated for screening peripheral neuropathy. Data were analyzed by using SPSS v 16. Descriptive statistics were used. Independent t test was used to compare the means of two groups of patients who had greater than 2 point on scale range (0-10 point) on physical assessment screening as peripheral neuropathy. $P< 0.05$ was considered statistically significant.

RESULTS

Out of 202 patients, 102 (50.5%) were men and 100 (49.5%) were women. The age ranged from 16 years to 88 years (mean 56.19±14.31). 139 (68.8%) of patients were <65 years of age. Mean duration of diabetes was (10.69±8.24); 115 (56.9%) had DM <10 years (Table (1).

Table 1. Demographic characteristics of sample (n=202)

Variable	Number (%)
Gender	
Male	102 (50.5)
Female	100 (49.5)
Age in years (mean 56.19±14.31)	
≥ 65 years	63 (31.2)
< 65 years	139 (68.8)
Marital status	
Single	12 (5.9)
Married	164 (81.2)
Widow/divorced	26 (12.9)
Level of education	
≤ 12 years	176 (87.1)
> 12 years	26 (12.9)
Duration of DM (mean 10.69±8.24)	
≥ 10 years	87 (43.1)
< 10 years	115 (56.9)
BMI (mean 29.68±86)	
Under weight	1 (0.5)
Normal weight	39 (19.3)
Over weight	75 (37.1)
Obese	87 (43.1)
Hemoglobin A1c (mean 8.18±2.17)	
≤ 7%	75 (37.1)
> 7%	117 (62.9)
Smoking	
Smoker	112 (55.4)
Non smoker	90 (44.6)
Type of DM	
Type1 DM	86 (42.6)
Type2 DM	116 (57.4)

Seventy two percent (n=146) patients had at least one associated disease (Table 2).

Table 2. Associated diseases (n=146; 72.2%).

Associated disease	Number (%)
Hypertension	71 (35.1)
Coronary heart disease	44 (21.7)
Renal disease	8 (4)
Lower limb ischemia	6 (3)
Other diseases	17 (8.4)

Most of patients had at least one symptom of peripheral neuropathy; 138 (68.3%) had numbness , followed by burning pain and increased sensitivity to touch (Table 3).

Table 3. Symptoms of peripheral neuropathy (n=138; 68.3%).

Symptom	Number (%)
Numbness	138 (68.3)
Burning pain	111 (55)
Very sensitive to touch	90 (44.6)
Muscle cramp in legs	101 (50)
Prickling feeling	88 (43.6)
Dry feet and crackles open	59 (29.2)
Amputation of toe	18 (8.9)
Foot ulcer	55 (27.2)

The prevalence of peripheral neuropathy among patients with diabetes mellitus in this study was54.45 ± 49.92. Prevalence of PN for men was 53.92 ± 50.09 and 55 ± 50 for women. Increasing age, longer duration of DM and higher HgA1c were associated with higher prevalence of DNP (Table 4).

DISCUSSION

Overall prevalence of PN among patients with DM was 54.45±49.92 in this study. The prevalence was higher in women than men (55±50 VS 53.92±50.09). The findings indicate that there were significant increase in prevalence of PN among DM patients with non target HbAIc (p <0.05), age ? 65 years (p <0.05), duration of diabetes ?10 years and BMI ?25 kg/m2 (p <0.05). Smoking and type of DM management were non significant.

Table 4. Prevalence of peripheral neuropathy according to demographic data (n=202).

Demographic data	Mean prevalence ± SD	P
Gender		
Male	53.92 ± 50.09	0.87
Female	55.00 ± 50.00	
Age		
≥ 65 years	69.84 ± 64.26	0.003*
< 65 years	47.48 ± 50.11	
Level of education		
> 12 years	38.46 ± 49.01	0.08
≤12 years	56.81 ± 49.67	
≥ 10 years	74.71 ± 43.71	0.000*
< 10 years	39.13 ± 49.01	
Body Mass Index		
≥25kg/m2	58.64 ± 49.40	0.01*
<25 kg/m2	37.50 ± 49.02	
Hemoglobin A1c		
> 7%	66.14 ± 47.51	0.00*
≤ 7%	34.66 ± 47.91	
Smoking		n
Smoker	58.92 ± 49.41	0.15
Non smoker	48.88 ± 50.26	
Type of DM		
Type1 DM	58.13 ± 49.62	0.36
Type2 DM	51.72 ± 50.18	

The findings are consistent with a recent study from Middle East Region (MER) including Jordan, Egypt, Lebanon and Gulf States.[5] A study from southern Jordan (Aqaba region) found higher prevalence of PN (84.2%) than in present study.[7] This might be attributed to the differences in the sample selected which included complicated patients with diabetic foot. The study from National Center for Diabetes, Endocrinology, and Genetics (Amman, Jordan) reported prevalence of sensory neuropathy as 14.9%, which is less than our study, and could be due to instrument used that included only monofilement.[8]

Age was significant risk factor associated with PN in our study; this finding was supported by several studies.[5,9-19] Many studies found that the prevalence

of PN is linked with the increased duration of DM,[5,9-20] which is consistent with the findings of our study. Poor glycemic control was significant in our finding in our study which had been reported by many similar studies. [9-17,19,21] Increased body mass index was significant in our study and is supported by many studies, [5,11,15] but other studies had inconsistent findings[14,18,19] which reported no significant differences between BMI and prevalence of PN. Three studies[13,16,18] found that gender difference was significant in prevalence of PN which wedid not find. Smoking was significantly associated with PN in two studies[13, 21] but this finding was inconsistent with our study which found no significant difference in prevalence of PN between smoker and non smoker patients.

The studies that used MNSI to assess the prevalence of PN reported different findings; one study[9] reported an overall prevalence of 51% compared with overall prevalence in the present study of 54.4%, while two other studies[12,16] reported a lower overall prevalence (31.9% and 33.5% respectively). This difference might be attributed to the difference in the sample characteristics.

One of the limitations of this study was that it was conducted at one hospital which may limit the generalization of findings. Another limitation is the use of MNSI as a screening instrument and not diagnostic instrument; the score of greater than 2 indicates further testing is needed for diagnosis PN through nerve conducting study.

CONCLUSION AND RECOMMENDATIONS

The prevalence of peripheral neuropathy among patients with diabetes in this study was high. Older age, longer duration of diabetes, non target HbA1c and overweight were significantly associated with increased prevalence of PN. Older adult patients and long duration of DM should be screened periodically for PN. Diabetic patient should be screened for PN continuously using simple instrument such MNSI because neuropathy develops gradually .The initial measures to prevent peripheral neuropathy include glycemic control and body weight control.

Author Contributions:
Conception and design: Khaldon Al-sarihin, Ibrahim Althwabia Collection and assembly of data: Khaldon Al-sarihin, Ibrahim Althwabia Analysis and interpretation of the data: Khaldon Al-sarihin, Fares Haddad, Mohammad Bani Khaled Drafting of the article: Khaldon Al-sarihin, Ibrahim Althwabia Critical revision of the article for important intellectual content: Khaldon Al-sarihin
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