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PREVALENCE OF DIABETIC PERIPHERAL NEUROPATHY AMONG TYPE 2 DIABETIC PATIENTS ATTENDING AL-BALADIYAT POPULAR CLINIC IN BAGHDAD

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ABSTRACT

Introduction: Diabetic peripheral neuropathy (DPN) has been defined as a demonstrable disorder, either clinically evident or subclinical, that occurs in the setting of diabetes without other causes for peripheral neuropathy. Goal: To evaluate the prevalence of diabetic peripheral neuropathy in a sample of type 2 diabetes individuals and identify risk factors. **Method:** A cross-sectional research was done on all known type 2 diabetic patients aged 30 or older who were on regular diabetes mellitus therapy at Al-Baladiyat popular clinic in Baghdad (selected conveniently) and agreed to participate. The research excluded pregnant women and individuals with neurological diseases that might induce peripheral neuropathy. The data collection tool includes a questionnaire about socio-demographic variables, disease history, and co-morbid illnesses; height, weight, BMI, and waist circumference; and the Michigan neuropathy screening instrument (MNSI), which has two parts: a history portion and a simple physical assessment for DPN diagnosis. **Results:** The study found a 55.3% prevalence of Diabetic Peripheral Neuropathy (DPN). Factors significantly associated with higher DPN prevalence included older age, male gender, rural residency, widowhood, lower education levels, retirement, smoking, longer diabetes and hypertension durations, ischemic heart disease, irregular treatment adherence, and infrequent doctor visits. No glucometer at home and taller height were also linked to higher DPN prevalence. No association was found with family history of diabetes, diet, weight reduction attempts, exercise, waist circumference, or BMI. Most (74.7%) patients with DPN identified by the MNSI physical assessment were unaware of their condition. **Conclusion:** Most research participants are ignorant of DPN, despite its high frequency. Logistic regression research identified DPN risk variables as age, duration of diabetes, educational level, pack-year smoked, frequency of blood sugar testing, and history portion score.

KEYWORDS: Prevalence, Diabetic Peripheral Neuropathy, Type 2 Diabetic, Al-Baladiyat Popular Clinic.

INTRODUCTION

According to established definitions, diabetic peripheral neuropathy refers to a diagnosable condition, either clinically obvious or subclinical, that develops in the presence of diabetes and no other known causes of peripheral neuropathy. The peripheral nerve system's somatic and/or autonomic regions may exhibit symptoms.[1] The existence of symptoms and/or indications of peripheral nerve dysfunction in diabetics after all other potential explanations have been ruled out is one straightforward definition of DPN.[2] The San Antonio Consensus Conference earlier adopted the following definition of neuropathy: "A demonstrated disease, whether clinically obvious or subclinical, that manifests in the presence of diabetes mellitus is referred to as diabetic neuropathy. The peripheral nerve system's somatic and/or autonomic regions may exhibit symptoms of the neuropathic disease".[3] There is no unified categorization since clinical symptoms come in so many different forms and may overlap. The most common categorization distinguishes between focal or multifocal neuropathies and fast reversible chronic symmetric polyneuropathies.[4] Throughout the years, several studies have shown that diabetes' indirect expenses are greater than its direct expenditures.[5] Spending on treating DPN sufferers is substantial. In the United States

of America, the estimated total yearly cost ranges from $4.6 to $13.7 billion.[6] Another research revealed a fairly comparable number, $10.1 billion as the yearly expenditures of DPN and its complications in the United States (for type 2 diabetes). According to estimates, managing DPN and its consequences accounts for up to 27% of the overall yearly expenditures of treating diabetes and 9% of all medical expenses borne by persons with diabetes.[7] The incidence of diabetes-related problems will rise as diabetes mellitus spreads globally at an epidemic rate.[8] Around 50% of those with diabetes who have had it for more than 25 years have DPN.[9] Distal symmetric polyneuropathy (DSP) affects as least one diabetes patient out of every four.[10] In a population-based research conducted in the United Kingdom, only 48% of those with type 2 diabetes who had been diagnosed for more than 20 years reported having substantial neuropathic symptoms.[11] According to an Australian research, the prevalence of DSP was 2% annually.[1] One goal was to determine how often diabetic peripheral neuropathy is among those with type 2 diabetes. Two, to conceal possible risk factors for diabetic peripheral neuropathy in those individuals.

METHOD

This cross-sectional study aimed to assess diabetic peripheral neuropathy (DPN) in type 2 diabetic patients aged 30 years or more attending Al-Baladiyat Popular Clinic in Baghdad. Pregnant women and patients with known neurological diseases were excluded. The study took place from September 1st to November 1st, 2008. Data was collected through a two-part questionnaire, which included socio-demographic variables, medical history, diabetes management, lifestyle factors, and anthropometric measures. The Michigan Neuropathy Screening Instrument (MNSI) was also utilized. A pilot study with 18 patients was conducted before the main data collection. All eligible type 2 diabetic patients attending the clinic during the data collection period were included in the study. The first part of the questionnaire covered socio-demographic variables such as age, gender, residence, marital status, education, occupation, smoking history, and alcohol consumption. Medical history questions addressed diabetes duration, family history of diabetes, and co-morbid illnesses like hypertension and ischemic heart disease. Diabetes management and lifestyle factors included treatment type, diet, weight reduction attempts, exercise, treatment regularity, reasons for irregularity, frequency of physician visits, and glucometer ownership. Anthropometric measurements included weight, height, waist circumference, and body mass index (BMI). The second part of the data collection involved the MNSI, which consisted of a history component and a physical assessment. The history component was filled out by the researcher and applied to all participants. The physical assessment included foot inspection, vibration sensation, muscle stretch reflexes, and monofilament testing. Data collection took place during daily visits, with the researcher spending two hours a day, five days a week at the clinic for the duration of the study.

RESULTS

The study of 150 diabetic patients showed a 55.3% prevalence of diabetic peripheral neuropathy (DPN), with a 95% confidence interval of 47.4-63.2%. Older age groups, urban residents, widows, lower education levels, and retirees showed higher DPN prevalence. Smoking history and pack-years smoked were significantly associated with DPN, while alcohol consumption was not. As show in table 1.

***Table (1)*: Distribution of study group by Diabetic Peripheral Neuropathy and certain sociodemographic variables.**

Possible Risk Factors Group with	Group with DPN		Group without DPN		Total		X^2	P
	No.=**83**	**%**	No.=**67**	**%**	No.**150**	**%**		
Age								
30-40	0	0.0	6	100	6	4.0		
41-50	3	15.0	17	85.0	20	13.3		
51-60	23	41.8	32	58.2	55	36.7		
61-70	36	83.7	7	16.3	43	28.7	45.488	0.000
≥70	21	80.8	5	19.2	26	17.3		
Sex								
Male	56	59.6	38	40.4	94	62.7	1.832	0.176
Female	27	48.2	29	51.8	56	37.3		
Residence								
Urban	75	52.8	67	47.2	142	94.7	6.822	0.008
Rural	8	100	0	0.0	8	5.3		
Marital status								
Married	49	52.1	45	47.9	94	62.7		
Single	5	29.4	12	70.6	17	11.3		
Widow	28	80.0	7	20.0	35	23.3	15.118	0.002
Divorced	1	25.0	3	75.0	4	27.0		

Educational Level								
Illiterate	11	100	0	0.0	11	7.3	26.270	0.000
Read and Write	18	85.7	3	14.3	21	14.0		
Primary School	18	52.9	16	47.1	34	22.7		
Secondary School	28	50.9	27	49.1	55	36.7		
Higher education	8	27.6	21	72.4	29	19.3		
Occupation								
Retired	38	76.0	12	24.0	50	33.3	24.194	0.000
Housewife	24	58.5	17	41.5	41	27.3		
Gov.	4	19.0	17	81.0	21	14.0		
*Employee	7	33.3	14	66.7	21	14.0		
Self - employee	10	58.8	7	41.2	17	11.3		
Unemployed								
Smoking								
Not smoker	36	44.4	45	55.6	81	54.0	10.866	0.004
Ex-smoker	22	59.5	15	40.5	37	24.7		
Current smoker	25	78.1	7	21.9	32	21.3		
	Group with DPN		**Group without DPN**		**Total**		**X^2**	**P**
	No.=83	**%**	**No.=67**	**%**	**No.150**	**%**		
Pack-year smoked for current and ex-smokers*								
≤ 24	19	52.9	16	47.1	34	51.5	7.508	0.006
> 24	28	84.4	6	15.6	32	48.5		
Alcohol Consumption								
Current drinker	5	83.3	1	16.7	6	4	1.932	0.126
Non - drinker	78	54.2	66	45.8	144	96		

The study found a significant association between the duration of diabetes and the prevalence of DPN, with DPN being more prevalent in patients with over twenty years of diabetes. DPN was also more prevalent in patients with hypertension and a history of ischemic heart disease. However, there was no significant association between family history of diabetes and DPN prevalence. As show in table 2.

***Table (2)*: Distribution of study group by Diabetic Peripheral Neuropathy and certain medical history variables.**

	Group with DPN		**Group without DPN**		**Total**		**X^2**	**P**
	No.=**83**	**%**	No.=**67**	**%**	No.**150**	**%**		
Diabetes durations(years)								
0-5	9	20.5	35	79.5	44	29.3	46.921	0.000
6-10	16	44.4	20	55.6	36	24		
11-20	44	78.6	12	21.4	56	37.3		
≥ 20	14	100	0	0	14	9.3		
Family History of diabetes								
Positive	34	54	29	46	63	42	1.230	0.541
1st degree relative	26	54.2	22	45.8	48	76.2		
2nd degree relative	8	57.1	6	42.9	14	22.2		
More*	0	0	1	100	1	1.6		
Negative	49	56.3	38	43.7	87	58	0.082	0.775
Having Hypertension								
No	35	46.1	41	53.9	76	50.7	13.362	0.004
Yes	48	64.9	26	35.1	74	49.3		
Duration <10 years	7	38.9	11	61.1	18	24.3		
10-20 years	28	68.3	13	31.7	41	55.4		
≥21 years	13	86.7	2	13.3	15	20.3	8.669	0.013
Ischemic heart disease								

Yes	23	71.9	9	28.1	32	21.3	4.503	0.034
No	60	50.8	58	49.2	118	78.7		

The study found a significant association between the type of treatment, regularity of treatment, diabetician visits, having a glucometer at home, and frequency of blood sugar measurement with the prevalence of DPN. DPN was more prevalent in patients on oral hypoglycemic drugs, those not taking treatment regularly, having fewer diabetician visits, not having a glucometer, and measuring blood sugar less frequently. No significant associations were found between diet, exercise, weight reduction efforts, and causes of irregularity in treatment with DPN prevalence. As shown in table 3.

***Table (3)*: Distribution of the study group by Diabetic Peripheral Neuropathy and different aspects in diabetes management.**

	Group with DPN		**Group without DPN**		**Total**			
	No.=**83**	**%**	No.=**67**	**%**	No.**150**	**%**	**X^2**	**P**
Type of Treatment								
Oral hypoglyycemics	72	64.3	40	35.7	112	74.7		
Insulin	9	27.3	24	72.7	33	22		
both	0	0	0	0	0	0	14.621	0.001
neither	2	40	3	60	5	3.3		
On Diet								
Yes	59	52.2	54	47.8	113	75.3	1.805	0.179
No	24	64.9	13	35.1	37	24.7		
Weight Reduction among overweight or obese*								
Yes	11	40.7	16	59.3	27	18.8	2.954	0.086
No	69	59	48	41	117	81.2		
Exercise								
Yes	4	30.8	9	69.2	13	8.7	3.475	0.062
No	79	57.7	58	42.3	137	91.3		
Treatment Regularity								
Yes	50	46.7	57	53.3	107	71.3	11.181	0.001
No	33	76.7	10	23.3	43	28.7		
Cause of Irregularity**								
Forgetfulness	19	76	6	24	25	62.5		
Side effect of drugs	5	71.4	2	28.6	7	17.5	2.571	0.463
Negligence	8	100	0	27	8	20		
Diabetician visit								
Frequency per year								
<1	57	72.2	22	27.8	79	52.7		
1-3	18	47.4	20	52.6	38	25.3	22.923	0.000
4 & more	8	24.2	25	75.8	33	22		
	Group with DPN		**Group without DPN**		**Total**			
	No.=83	**%**	**No.=67**	**%**	**No.150**	**%**	**X^2**	**P**
Glucometer at home								
Yes	23	34.8	44	65.2	46	30.7	21.615	0.000
No	60	64.4	23	35.6	104	69.3		
Frequency of blood sugar measure								
≥Twice monthly	7	16.7	35	83.3	42	28		
Once monthly	18	56.2	14	43.8	32	21.3		
Once every 2 months	6	50	6	50	12	8	42.941	0.000
Less than that	52	81.2	12	18.8	64	42.7		

The study found significant associations between height and DPN prevalence in both males and females, with DPN being more prevalent in taller individuals. No significant associations were found between waist circumference, BMI, and DPN prevalence. A significant association was found between the history score of the Michigan Neuropathy Screening Instrument (MNSI) and DPN prevalence, with higher scores indicating higher DPN prevalence. The history portion of MNSI was an independent risk factor for DPN. As shown in table 4.

Table (4): Distribution of study group by Diabetic Peripheral Neuropathy and certain anthropometric measures, Distribution of study group by Diabetic Peripheral Neuropathy and final history score.

Anthropometric measure	Group with DPN		Group without DPN		Total		X^2	P
	No.=**83**	%	No.=**67**	%	No.**150**	%		
Height(m)								
Males ≤1.65 *	20	47.6	22	52.4	42	44.7	4.506	0.034
>1.65	36	69.2	16	30.8	52	55.3		
Females ≤1.54	9	33.3	18	66.7	27	48.2	4.624	0.032
>1.54	18	62.1	11	37.9	29	51.8		
Waist circumference(cm)								
Males ≤ 100 *	28	57.1	21	42.9	49	52.1	0.251	0.616
>100	28	62.2	17	37.8	45	47.9		
Females ≤ 100	11	45.8	13	54.2	24	42.9	0.095	0.485
> 100	16	50	16	50	32	57.1		
BMI								
Normal <25	3	50	3	50	6	4	2.041	0.360
Overweight 25-29.9	19	46.3	22	53.7	41	27.3		
Obese ≥ 30	61	59.2	42	40.8	103	68.7		
	Group with DPN		**Group without DPN**		**Total**		X^2	P
	No.=**83**	%	No.=**67**	%	No.**150**	%		
History score								
0-4	23	29.1	56	70.9	79	52.7	49.519	0.000
5-7	38	77.6	11	22.4	49	32.7		
≥8	22	100	0	0	22	14.7		

After applying logistic regression on the above possible risk factors, there has been shown that age, duration of diabetes mellitus since diagnosis, educational level, pack-year smoked, frequency of blood sugar measurement and history portion score were the independent risk factors for DPN. [Table 5].

***Table (5)*: Showing the independent risk factors for DPN and their P-values by logistic regression.**

Independent variable	P-value
Age class(years)	0.000
Diabetes Duration(years)	0.000
Educational level	0.024
Pack-year smoked	0.048
Frequency of blood sugar measurement	0.002
History portion of MNSI	0.000

DISCUSSION

The prevalence of distal symmetric sensory or sensorimotor polyneuropathy (DPN) among type 2 diabetic patients varies greatly due to inconsistencies in diagnostic procedures, referral bias, and population studied.[1,12] In this study, a 55.3% prevalence was found using the clinical portion of the MNSI. Previous reports show prevalence rates between 13-46%.[13] Some studies using MNSI found 30.9%.[13] and 51.7%.[14] prevalence, while others found 28% in population-based studies.[15] A study in Iraq reported a 21.9% prevalence.[17] This variation highlights the importance of standardized diagnostic criteria to accurately assess DPN prevalence. This study found a significant association between DPN prevalence and age, aligning with previous research.[18,19] Male patients had a higher DPN prevalence, but no significant statistical association was found between gender and DPN.[20,21] Living in rural areas and being widowed were associated with a higher DPN prevalence, but no previous studies focused on marital status as a risk factor. Lower education levels correlated with higher DPN prevalence, in agreement with the Canadian study.[22] Unemployment was also associated with a higher DPN prevalence.[22] Current smoking was significantly linked to DPN in the present study, consistent with previous findings.[22] but contradicted by the Seattle study.[23] No significant association was found between alcohol consumption and DPN prevalence.[19,23] In summary, DPN prevalence is associated with age, residence, marital status, education, occupation, and smoking habits, while gender and alcohol consumption show inconsistent associations across studies. This study found significant associations between DPN prevalence and diabetes duration.[21,22] hypertension.[19,20] and ischemic heart diseases.[19] Family history of diabetes showed no effect on DPN prevalence. Hypertension control reduces complications more than glycemic control [24]. In terms of treatment, prevalence of DPN was highest among patients on oral hypoglycemic drugs, possibly due to older patients being prescribed these medications or better glycemic control in insulin-treated patients. Diet and exercise did not show significant associations with DPN prevalence.[25] possibly due to subjectivity in patient responses. Regularity of treatment and diabetician visits were important factors, with more frequent visits associated with lower DPN prevalence.[26] This may improve metabolic control and facilitate early detection and management of diabetes complications. In a German study, self-monitoring of blood glucose (SMBG) was associated with decreased diabetes-related

morbidity and all-cause mortality in type 2 diabetes.[27] The European study indicated that more frequent SMBG was associated with better metabolic control.[28] Meanwhile, height was found to be a risk factor for neuropathy.[29] Waist circumference wasn't significantly associated with neuropathy in some studies.[30] Higher BMI was linked to a greater risk of DPN in various studies.[21] but a significant association wasn't found in the current study. Using the history portion of the MNSI, a significant association between the prevalence of DPN and increasing scores was observed, possibly due to recall bias.[15] Surprisingly, 75% of patients were unaware of having DPN, highlighting the importance of early detection and intervention.

CONCLUSION

One, DPN was shown to be prevalent among 55% of the type 2 diabetes individuals in the study.

Second, 75% of those who have DPN don't know they have it. Logistic regression analysis showed that the following were all significant independent risk variables for DPN: age, education, duration of diabetes, frequency of blood sugar monitoring, and pack-year smoked.

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