PREVALENCE AND RISK FACTORS OF DIABETIC PERIPHERAL NEUROPATHY: A CROSS-SECTIONAL STUDY FROM YEMEN.

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ABSTRACT:

background*: Diabetes mellitus is a crucial worldwide health concern as one of the most prevalent non-communicable diseases. One of the most frequent microvascular complications of diabetes is diabetic peripheral neuropathy, which is defined as the presence of peripheral nerve dysfunction attributed to chronic hyperglycemia after ruling out other causes.*

Aim of The Work: *The study was conducted to determine the prevalence and associated risk factors of diabetic peripheral neuropathy among diabetic patients attending the diabetic clinic at Ibn-Sina teaching hospital.*

Patients and Methods*: This was a hospital-based analytical cross-sectional study in the diabetic clinic at Ibn-Sina authority hospital, which was implanted during the study period from November 2022 to March 2023. The data was collected from 300 participants of diabetic patients by using interview-administered questionnaires, clinical examination and medical records. The collected data coded and analyzed using Statistical Package for the Social Sciences (SPSS) version 25.*

Results*: The prevalence of diabetic peripheral neuropathy was (52%), and it was statistically significant with the low-income level (P = 0.013), physically inactive patient (P = 0.012), irregular visits to physicians (P = 0.027), High hemoglobin A1c and fasting blood sugar levels (P = 0.02) and (P = 0.027) respectively. The prevalence was increasing in uneducated patients (OR 2.919, 95%CI 1.130 - 7.539 P = 0.027) and physically inactive patients (OR 1.920, 95%CI 1.102 - 3.345 P = 0.021).*

Conclusion*: Our study shows that more than half of participants (52%) have diabetic peripheral neuropathy. High hemoglobin A1c and fasting blood sugar levels, low educational level, low income, decreased physical activity, and irregular visits were the associated risk factors of diabetic peripheral neuropathy.*

Keywords*: Diabetes mellitus, Diabetic peripheral neuropathy, Risk factors, Ibn-Sina Hospital.*

INTRODUCTION:

Diabetes mellitus (DM) is a chronic hyperglycemic state caused by metabolic disturbances, primarily due to absolute insulin deficiency or abnormalities in insulin action(1). This prolonged hyperglycemia eventually causes secondary patho-physiologic changes in multiple organ systems, manifesting as microvascular and macrovascular complications (2).

The burden of DM is rising at an alarming rate, making it a crucial worldwide health concern as one of the most prevalent non-communicable diseases affecting around

6% of the global population and contributing to high morbidity and mortality [1,3&4].

According to International Diabetes Federation (IDF) 2021 estimation, there were 537 million adults living with DM worldwide, and the number will increase to 643 million by 2030[5].

In the Middle East and North Africa, there were approximately 73 million adults living with DM, with those of working age (under the age of 60) experiencing the highest percentage of diabetes-related deaths (24.5%)[6]. The prevalence of DM among adults in Yemen in 2022 was 4.0% with total cases of 613,900[7].

One of the most prevalent microvascular consequences of DM is diabetic neuropathy (DN) which presents from an early stage of DM and slowly progresses over several years to systemic impairment involving the peripheral, central, and autonomic nervous systems [1&3].

According to the American Diabetes Association (ADA), the most common variety is diabetic peripheral neuropathy (DPN) which is defined as the presence of peripheral nerve impairment symptoms and/or signs in diabetic patients after ruling out other potential causes [8] and may present even in the absence of symptoms [2].

Chronic, distal, symmetrical, length-dependent sensorimotor polyneuropathy is the classic type of DPN [9]. It typically manifests as numbness, paresthesia, burning and prickling pain, loss of coordination, aberrant ankle reflexes, foot ulcers, and eventually Charcot's joints. DPN significantly raises the chance of amputation by 1.7 times [1].

Consequently, DPN has been reported in up to 50% of diabetic patients [10]. In the United States, the prevalence was 50% [11]. Meanwhile, in China and India, the prevalence of DPN were found to be 34.8% and 28.85% respectively [5&12]. whereas in Tanzania the rate was 72.2% [13].

However, the overall DPN rate in the Middle East was 53.7% [14]. According to national data in Egypt that revealed DPN developed in more than 60% of diabetic's patients [15], whereas the prevalence in Sudan was 42% [16]. Recent study conducted in Saudi Arabia shows that 39% of diabetic patients suffer from DPN [4].

Locally, in 2014 the National Center of Diabetes in Yemen conducted a study with 306 participants revealed that the DPN prevalence among diabetic patients was 56.2% [17]. Furthermore, another study in Aden in 2019 found that the DPN rate was 60.48% according to the neurosymptom and neurodisability scoring (NSS & NDS) [18].

The prevalence of DPN increased significantly with the increment in the duration of DM, as well as uncontrolled HbA1c compared to patients with controlled HbA1c [19]. Although, observational studies showed that even those with strict glycemic control (HbA1c of less than 5.4%) are still at risk. Moreover, cardiovascular risk factors, such as obesity, hypertriglyceridemia, hypercholesterolemia, hypertension, and cigarette smoking all contribute to the pathogenesis of DPN [20].

Furthermore, previous studies documented that the hazard of diabetic neuropathy was increased with the increase of age. It might be related to the three main alterations involved in the pathologic changes of diabetic neuropathy: inflammation, oxidative stress, and mitochondrial dysfunction [21].

Early identification and adequate management of neuropathy in diabetic subjects are essential for reducing foot ulceration, amputation, and other lifelong disabilities and improving the quality of life [1]. Whereby without intervention, about one-third of the estimated population in 2050 will have DM, and approximately 50% of diabetic patients at that time will have DPN [22].

According to our knowledge, there is a lack of published data regarding the

prevalence of DPN in Hadhramout, despite the fact that both developed and developing nations have seen an upsurge in this problem[23].

AIM OF THE WORK:

This study aimed to determine the prevalence and associated risk factors of diabetic peripheral neuropathy in the Ibn-Sina hospital in Mukalla city, Hadhramout, Yemen.

PATIENTS AND METHODS:

Study Design:

An analytical cross-sectional study.

Study area & time:

The study was conducted from November 2022 to March 2023 in the diabetic clinic at Ibn-Sina hospital. Which is considered as the main hospital in the western of Mukalla city - the capital city of Hadhramout governorate.

Study population:

The study was carried out on 300 patients who are attending the diabetic clinic at Ibn Sina hospital" and had already been diagnosed with Type 1 or type 2 DM and coming for a follow-up visit.

Inclusion and Exclusion Criteria:

- **Inclusion criteria:**

Patients who are diagnosed with T1DM or T2DM, both genders, adults over 18.

- **Exclusion criteria:**

1. T1DM or T2DM who have no baseline records at the diabetes clinic.
2. Patients with gestational or other types of DM or aged less than 18.
3. Patients with bilateral lower limb amputation.
4. Pregnant or lactating women.
5. Patients who suffered from mental illness.

Sample size estimation:

The sample size was calculated by using the following formula:

$$n = \frac{N}{1 + N(e)^{2}}$$

Where:

n: is the sample size to be computed.
N: is the population size.
e: is the degree of accuracy desired or accepted margin error (0.05).

$$n = \frac{12000}{1 + 1200\ (0.05)^{2}}$$

$\boldsymbol{n}$ = 300

The total number of the sample size for this study is 300 diabetic patients.

Sampling technique and frame:

Convenience sample technique was used in this study, which carried out on patients over 18 years old who had already been diagnosed with either T1DM or T2DM who were available at the time of the study and fulfilled the criteria until the calculated sample size was reached.

Data collection and tool:

The data was collected by interview-administered questionnaires with closed questions, clinical examination and medical records that were documented since 2019 and are updated weekly were used in this study. To enhance the questionnaire validity, the questionnaire was developed in the English language by referring to a previous study[28,24] with some modifications. Furthermore, it was submitted to three specialists for review and suggested editing, and to strengthen the reliability of the questionnaire, a pilot test was conducted by collecting data from 10 subjects not included in the sample.

This study tools consist of three sections:

1. ***Socio-demographic characteristics and general information (7 questions).***
2. ***Potential risk factor associated with DPN (14 questions).***

These risk factors include the DM duration, quality of DM control, BMI, smoking status, hypertension, cardiovascular disease, dyslipidemia, nephropathy, and physical activity.

They were assessed using specific criteria. Therefore, (1) DM Duration it was calculated as age at data collection minus age at onset of DM or by patient's estimation in case the date of onset isn't documented. (2) Diabetes control quality (glycemic status) was classified according to the HbA1c level. HbA1c <7.0% is considered as good quality control while HbA1c of 7.0-8.0% is considered as fair control and HbA1c of >8.0% as poor control. (3) BMI ≥25 kg/m2 was considered as overweight. (4) Smoker was defined as a person who smokes at least 1 cigarette, pipe, cigar or bidi per day. (5) Hypertension was defined as the latest (within three months) blood pressure (BP) readings systolic ≥140 and/or diastolic ≥90 mmHg), furthermore it was assessed by either a documented diagnosis of hypertension or by taking antihypertensive medications additionally it was confirmed by measuring it in the clinic. (6) Coronary artery disease was assessed based on history of physician diagnosed. (7) CVD (example: previous stroke) and/or on current CVD treatment. (8) Dyslipidemia was assessed based on either a documented diagnosis of dyslipidemia or taking any lipid-lowering medication. (9) According to nephropathy determined by documented diagnosis [(2)]. (10**)** Regarding physical activity, physically inactive refers to patients performing moderate intensity activity less than 150 minutes per week [(3)].

3. ***Michigan Neuropathy Screening Instrument (MNSI).***

The MNSI is a well-known instrument used to assess peripheral neuropathy among diabetic patients with sensitivity of 80% and specificity of 95%. Furthermore, the MNSI is validated as a simple noninvasive, inexpensive measurement tool that incorporates sensory and motor components of neuropathy which consist of two parts: the first is history and the second is physical assessment.

The first part of MNSI assessed the presence of neuropathic symptoms which consists of 15 items. For the patient questionnaire, a higher score (out of a maximum of 13 points) indicates more neuropathic symptoms. Responses of "yes" to items 1-3, 5-6, 8-9, 11-12, 14-15 are each counted as one point. A "no" response on items 7 and 13 counts as 1 point. Item number (4) is a measure of impaired circulation and item number (10) is a measure of general anesthesia and they are not included in scoring. To decrease the potential for bias, all scoring information has been eliminated from the patient version of the questionnaire.

The modified MNSI examination part was carried out to assess the following five variables on each foot:

1. Inspection of each foot for deformities, dry skin, calluses or infections, and each foot with any abnormality received a score of one and if not 0.
2. The presence or absence of ulceration, and each foot with ulcer received a score of one and if not 0.
3. Examination of vibration is carried out using a tuning fork at 128 Hz. Vibration sensation scores 0 if present and 1 for absent vibration sensation.
4. The ankle reflex examination is carried out using a Hummer. If the ankle reflex is present, it scores as 0, if absent even with the Jendrassic maneuver reflex it is designated as absent and scores 1.
5. The loss of pressure sensation was carried out by a monofilament if it is normal

sensation, it scores 0 and 1 if absent.

A score ≥ 7 in the history questionnaire or/and ≥ 2 in clinical score are both considered indicative of peripheral neuropathy [25].

The questionnaire items were translated to Arabic language to facilitate its presentation. In addition, to avoid any duplication, the interviewers asked firstly whether they have been interviewed before about this topic or not.

Pilot study:

To pre-test the methodology and improve the quality and efficiency of the study, a pilot testing was conducted by the data collectors through interviewing 10 samples before starting the field work and after obtaining the research approval.

Data analysis:

The statistical package for social sciences (SPSS version 25) was used to summarize the data numerically (mean, standard deviation and median) and graphically (frequency tables and graphics). $P \leq 0.05$ was considered significant for all statistical analyses.

Ethical Consideration:

Ethical approval was obtained from the ethical committee of Hadhramout University, College of Medicine, and Health Science.

A written informed consent was acquired from the participants after providing them information about the study and clarifying its objectives.

RESULTS:

A total of 300 patients with DM were included in this study with 266(88.7%) of them having T2DM and only 34(11.3%) with T1DM. As shown in diagram (1), the DPN was diagnosed in 156 participants with an overall prevalence of 52%. Although the majority 138(51.9%) of DPN patients were with T2DM, the prevalence of DPN among T1DM was higher 18(52.9%) as shown in diagram (2). According to the MNSI questionnaire used in this study 15% of study participants had a score of ≥ 7 and 50% had score ≥ 2 in history and examination assessment parts, respectively.

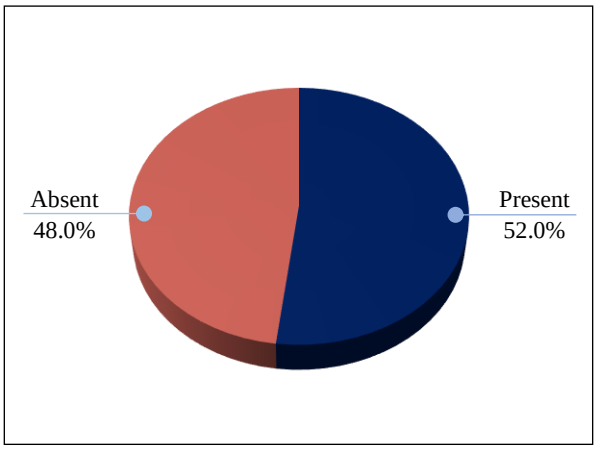

Diagram 1: Prevalence of DPN among diabetic patients (n=300).

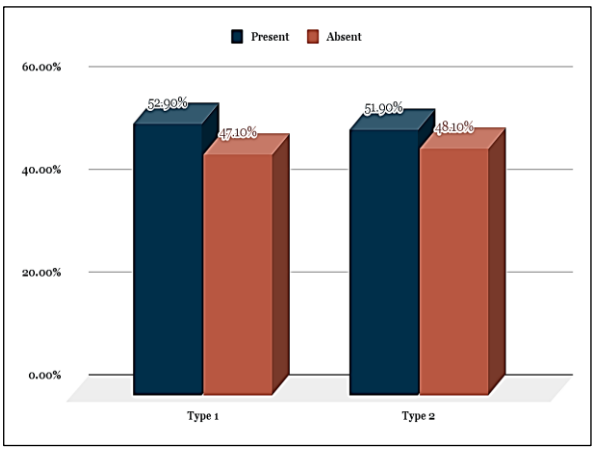

Diagram 2: Distribution of DPN among diabetic patients by types.

Table (1) the socio-demographic characteristics showed that more than half of patients 167(55.7 %) were male and 133(44.3 %) were female. The patients with the age group of 50 years and above constitute 199(66.3%) of all participants. The majority 262(87.3%) of participants reside in urban areas and only 38(12.7%) living in rural areas. Regarding the economic state of participants 124(41.3%) of patients came

with low income, 142(47.3%) of them with medium income and only 34(11.3 %) with high income. Whereas it was found that 181(60.3%) of patients were unemployed. As shown in the table most of the diabetic patients 251(83.7%) were married.

Table 1: Socio-demographic characteristics of diabetic patients.

Variable		(n)	%
Gender	Male	167	55.7%
	Female	133	44.3%
Age	≤ 30 years	11	3.7%
	30-39 years	13	4.3%
	40-49 years	77	25.7%
	≥ 50 years	199	66.3%
Address	Rural	38	12.7%
	Urban	262	87.3%
Income	Low	124	41.3%
	Medium	142	47.3%
	High	34	11.3%
Occupation	Government employee	51	17.0%
	Private sector	68	22.7%
	Unemployed	181	60.3%
Marital status	Single	14	4.7%
	Married	251	83.7%
	Divorced/**Widowed**\	35	11.7%

Diagram (3) shows the educational level of patients with DM, the percentages were 87(29%), 119(39.7%), 65(21.7%) uneducated, primarily and secondary level, respectively. Therefore, only 29(9.7 %) had a college degree and above.

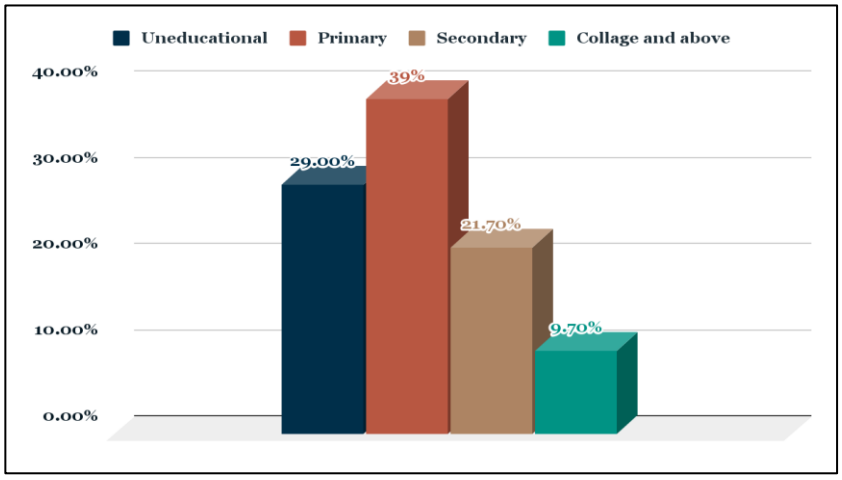

Diagram 3: Educational level of diabetic patients.

Table (2) shows the association between the basic socio-demographic characteristics and the presence of DPN in diabetic patients included in the study. There was statistical significance (P = 0.013) between the income level of the patients and the presence of DPN, the patients who had low income have higher prevalence of DPN compared with those who had medium or high income. Meanwhile, underducated patients show significant association (P = 0.012) in regard to those with high educational levels. However, gender, address, occupations, and material status show no significant association (P = 0.260) (P = 0.102), (P = 0.141), (P = 0.110), (P = 0.394) respectively.

Table 2: Association between socio-demographic variables and DPN among diabetic patients.

Variable		DPN				P value
		Absent		Present		
		%	(n)	%	(n)	
Gender	Male	50.9%	85	49.1%	82	0.260
	Female	44.4%	59	55.6%	74	
Age	≤ 30 years	72.7%	8	27.3%	3	0.102
	30-39 years	38.5%	5	61.5%	8	
	40-49 years	55.8%	43	44.2%	34	
	≥ 50 years	44.2%	88	55.8%	111	
Residency	Rural	36.8%	14	63.2%	24	0.141
	Urban	49.6%	130	50.4%	132	
Income	Low	37.9%	47	62.1%	77	0.013 *
	Medium	55.6%	79	44.4%	63	
	High	52.9%	18	47.1%	16	
Occupation	Government employee	54.9%	28	45.1%	23	0.110
	Private sector	55.9%	38	44.1%	30	
	Unemployed	43.1%	78	56.9%	103	
Education	Collage and above	65.5%	19	34.5%	10	0.012 *
	Secondary	58.5%	38	41.5%	27	
	Primary	46.2%	55	53.8%	64	
	Uneducated	36.8%	32	63.2%	55	
Marital status	Single	64.3%	9	35.7%	5	0.394
	Married	47.8%	120	52.2%	131	
	Divorced/ **Widowed**	42.9%	15	57.1%	20	

Table (3) reveals the association between DPN and risk factors among all participants. A significant association was found between the presence of DPN and irregular visits of diabetic patients to physicians (P = 0.027) where 55 out of 89 patients who had irregular visits, came with DPN. Furthermore, the results show a significant association in regard to physical activity level and development of DPN (P = 0.012), as 107 of physically inactive patients 41 of them had DPN. Regarding the paraclinic investigation, High HbA1c and FBS levels show significant correlation with the presence of DPN (P = 0.02) and (P = 0.027), respectively. On the other hand, different treatment modalities including insulin (P = 0.335) and non-insulin (P = 0.474) had no association with development of DPN. However, the majority of patients had T2DM, a significant association between types of DM and DPN couldn't be established (P = 0.907). Moreover, no statistical significance was found in regard to DM duration, BMI, smoking or family history of DM (P = 0.243), (P = 0.180), (P = 0.160) and (P = 0.484), respectively. Other chronic diseases such as cardiovascular diseases (P = 0.400), hypertension (P = 0.148), dyslipidemia (P = 0.892) and nephropathy (P = 0.332) didn't show any association.

Table 3: Association between risk factors and DPN among diabetic patients.

Variable			DPN				P value
			Absent		Present		
			(n)	%	(n)	%	
Family History		No	45	51.1%	43	48.9%	0.484
		Yes	99	46.7%	113	53.3%	
Type of DM		Type 1	16	47.1%	18	52.9%	0.907
		Type 2	128	48.1%	138	51.9%	
Hypertension		No	93	51.4%	88	48.6%	0.148
		Yes	51	42.9%	68	57.1%	
Cardiovascular disease		No	125	49.0%	130	51.0%	0.400
		Yes	19	42.2%	26	57.8%	
Dyslipidemia		No	94	47.7%	103	52.3%	0.892
		Yes	50	48.5%	53	51.3%	
Nephropathy		No	133	48.9%	139	51.1%	0.332
		Yes	11	39.3%	17	60.7%	
Physical activities		Physical inactive	41	38.3%	66	61.7%	0.012*
		Physical active	103	53.4%	90	46.6%	
Regular visit		No	34	38.2%	55	61.8%	0.027*
		Yes	110	52.1%	101	47.9%	
Duration of DM		Less than 5 years	57	49.0%	58	50.4%	0.243
		5-10 years	53	52.5%	48	47.5%	
		More than 10 years	34	40.5%	50	59.5%	
Treatments regimen	**Insulin**	No	113	49.6%	115	50.4%	0.335
		yes	31	43.1%	41	56.9%	
	Non-insulin	No	24	43.6%	31	56.4%	0.474
		yes	120	49.0%	125	51.0%	
	Anti HTN	No	104	50.7%	101	49.3%	0.164
		yes	40	42.1%	55	57.9%	
	Statin	No	107	49.0%	112	51.1%	0.625
		yes	37	48.9%	44	54.3%	
	Others	No	129	49.0%	134	51.0%	0.332
		yes	15	40.5%	22	59.5%	
HbA1C		Good control (less than 7%)	40	54.8%	33	45.2%	0.002*
		Fair control (7-8%)	53	59.6%	36	40.4%	
		Poor control (above 8%)	51	37.0%	87	63.0%	
FBS		Less than 200 mg/dl	59	56.7%	45	43.3%	0.027*
		200 mg/dl and above	85	43.4%	111	56.6%	
BMI		Less than 18.5	13	9.0%	7	35.0%	0.180
		18.5 to 24.9	60	41.7%	58	49.2%	
		25 to 29.9	50	34.7%	57	53.3%	
		30 and above	21	14.6%	34	61.8%	
Smoking		Current	16	11.1%	15	48.4%	0.160
		Former	20	13.9%	35	63.6%	
		Never	108	75.0%	106	49.5%	

Anti HTN: antihypertensive; **HbA1C:** glycosylated hemoglobin; **FBS:** fasting blood glucose, **BMI:** body mass index

Table (4) shows the logistic regression for risk factors that predict the development of DPN. The result revealed two independent risk that are highly associated with DPN: the uneducated patients (OR 2.919, 95%CI 1.130 - 7.539 P = 0.027) and physical inactivity level of patients (OR 1.920, 95%CI 1.102 - 3.345 P = 0.021). However, low-income level, FBS level more than 200 mg/dl, HbA1c >8% and irregular visits to physicians show no significant association with DPN.

Table 4: Logistic regression model to predict the development of DPN in diabetic patients.

Variable	P Value	Odds Ratio	95%CI for Odd Ratio	
			Lower	Upper
Low income	0.676	0.840	0.372	1.898
Uneducated	0.027*	2.919	1.130	7.539
Physically inactive	0.021*	1.920	1.102	3.345
Irregular visit to physician	0.109	1.536	0.909	2.593
Glycosylated hemoglobin (HbA1C) > 8	0.081	1.791	0.930	3.447
Fasting Blood Sugar ≥ 200 mg/dl	0.844	1.059	0.600	1.870

DISCUSSION:

Diabetes mellitus is one of the important public health concerns challenging the world in the 21st century [17]. The most common complication of DM is DPN, and its progression significantly causes great physical and mental suffering to the patients and their families, worsens the patient's quality of life, and increases mortality and disability. Therefore, there is a need for a better understanding of the prevalence and risk factors associated with DPN to further develop preventive strategies in patients diagnosed with DM. This study was conducted to determine the prevalence and associated risk factors of diabetic peripheral neuropathy among diabetic patients.

The overall prevalence of DPN in this study was 52%, similar findings were reported in Kuwait 53.9% [24] and Ethiopia 53.6% [3]. However, this is considerably higher compared with studies conducted in Jordan 39.5% [27], Morocco 15.3% [26], and Nepal 45.45% [1] and lower than the proportions reported in the National Center of Diabetes in Yemen, Sanaa 56.2% [17], Aden 60.48%[18], and Nigeria 75%[20].

The current study showed that the prevalence of DPN among type1 diabetic patients was higher compared with type 2 diabetic patients 18(52.9%), 138(51.9%) respectively. These variations were due to differences in the number of patients included in our study in each type and statistical analysis. The explanation of high prevalence of DPN in this study was that 63% of the patients had poor glycemic control HbA1c > 8 %, and 40.4% had fair glycemic control, which also could be the result of different medical care access, genetic predisposition, and population studied awareness.

The current study showed that patients aged above 50 years had a high prevalence of DPN as well as in India [5], while in Tanzania [13] patients aged above 60 years had a high prevalence of DPN. Possible reasons could be justified as DPN is a chronic complication of DM and takes time to develop, so it is expected in older diabetic patients. The fact that the nervous system is vulnerable to continual metabolic stress and the degenerative nature of physiological well-being with aging [28]. Thereby, the effect of aging combined with the deleterious effects of hyperglycemia can result in an increased prevalence of DPN as one gets old.

In regard to risk factors, many previous studies conducted in Yemen [17,18] KSA [9,19] Sudan [16] Libya [14] Nigeria [20] India [2] and Nepal [1] showed that chronic exposure to hyperglycemia is a key factor in the development of neuropathy which induce oxidative stress and endothelial damage. Meanwhile, unexpected findings were obtained that there was no association between the duration of DM with the development of DPN in this study, the same finding was also found in KSA [10]. This could be explained by the difference in the population, study setting, and the time of the diagnosis.

Moreover, DPN was not significantly related to the modality of diabetes control (Insulin and/or non-insulin). However, those who use non-insulin therapy had a higher percentage of DPN than those on insulin. The same finding was reported in India [2]. Although, there was a statistically significant association in using oral hypoglycemic agents to increase the risk of developing DPN in Sudan [16], as well as in Tanzania[13]. Further studies using a randomized clinical trial are needed to evaluate the effects of treatment modality on DPN.

The main risk factors identified by this study were HbA1c and FBS. There is a statistically significant association between HbA1c and FBS and DPN. The occurrence of DPN increased with the increase in HbA1c. Patients with HbA1c >8% were higher in developing DPN than patients with HbA1c 7-8%, and the latter had a higher percentage of DPN than patients with HbA1c less than 7%. This finding is supported by studies from the MENA region [10,16,17,19] and the world [2,8,20]. In contrast to the results of Aden [18] and Tanzania [13] which had no statistical association. Furthermore, DPN patients were associated with high levels of FBS, this concurs with what was reported in KSA [9,10], Libya [14]. and India [2], This emphasizes the FBS as a more robust indicator of blood sugar control.

Indeed, BMI and smoking were not observed to be significant risk factors for DPN among patients in this study. This is obviously congruent with the results of Aden[18], KSA [19], and India [2]. This could be consistent with the duration of smoking and the number of cigarettes per day which needs further assessment. Regarding BMI, the majority of our patients were non-obese. Otherwise, the BMI in solitary was significantly associated with DPN in KSA[10], as well as smoking in Ethiopia [3] and USA[11]. While they both were observed to be in correlation with DPN in Sudan [16] and Libya[14].

The current study found no association of comorbidities (Hypertension, cardiovascular disease, dyslipidemia, nephropathy) with DPN which was consistent with the findings of India [2] rather than KSA study [19]. It is worth adding that physical activities and regular visits are associated significantly with DPN among our patients. The same finding was obtained from Jordan study[27]. Those who have a sedentary lifestyle are at more risk to develop DPN which is consistent with the findings of Ethiopia[3]. The possible reason for this association might be that physical exercise can increase microvascular circulation, the release of neurotropic factors, and the attenuation of oxidative stress. Regarding regular visits, those who tend to have regular visits to the physician are less likely to develop DPN. This reflects high awareness about diabetic control and early detection of any abnormal changes.

Regarding logistic regression, we identified two unique risk factors that were significantly and independently associated with DPN development, educational level and physical inactivity. This emphasizes the importance of implementing a health program to educate diabetic patients about the development and prevention of macro-vascular complications and neuropathy. Although the educational level was inconsistent with a study conducted in Sudan[16] In agreement with a result obtained from a study conducted in Ethiopia[3] our data showed that physical inactivity was an independent predictor of DPN. While low income, irregular visits to the physician, FBS $\geq$ 200 mg/dl and HbA1c greater than 8 were not identified as predictive risk factors.

Finally, since, this is a clinic-based study that covers the diabetic population who approached the hospital for follow-up and management of their condition. To our knowledge and to date this is the first study conducted in Hadhramout in Ibn-Sina Hospital. In addition, the data was collected using an interview-administered

questionnaire and the MNSI tool as a sensitive, highly predictive, and inexpensive screening tool to determine the prevalence of DPN, which all enhance the strength of the current study. Nevertheless, the findings of this study had some limitations. The lack of nerve conduction testing, due to its non-affordability and low resources which is the gold standard diagnostic test for confirmation of DPN diagnosis. Moreover, the study was conducted in one health facility.

Conflict of interest:

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List of Abbreviations

BMI : Body mass index
BP : Blood pressure
CVD : Cardiovascular disease
DM : Diabetes mellitus
DN : Diabetic neuropathy
DPN : Diabetic peripheral neuropathy
FBS : Fasting blood sugar
MNSI : Michigan Neuropathy Screening Instrument
T1DM : Type 1 diabetes mellitus
T2DM : Type 2 diabetes mellitus
HbA1c : Hemoglobin A1c

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انتشار وعوامل خطورة اعتلال الاعصاب الطرفية السكري: دراسة مقطعية من اليمن

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المقدمة: يشكل مرض السكري مصدر قلق مهم عالميا باعتباره أحد أكثر الأمراض غير المعدية انتشارًا. ويعد الاعتلال العصبي السكري الطرفي أحد أكثر مضاعفات الأوعية الدموية الدقيقة شيوعا لمرض السكري، ويعرف بوجود خلل وظيفي في الأعصاب الطرفية نتيجة ارتفاع سكر الدم المزمن بعد استبعاد الأسباب الأخرى.

المنهجية: هذه دراسة مستعرضة تحليلية أجريت في عيادة السكري بهيئة مستشفى ابن سينا العام في الفترة من نوفمبر 2022 إلى مارس 2023. تم جمع البيانات من 300 مريض بالسكري، من خلال استبيانات تمَّ ملؤها بالمقابلة المباشرة مع المرضى، والفحص السريري والسجلات الطبية. تم ترميز البيانات المجمعة وتحليلها باستخدام الحزمة الإحصائية للعلوم الاجتماعية SPSS الإصدار 25.

النتائج: من مجموع 300 مريض سكري مشارك في الدراسة، أظهرت النتائج أن أغلبية المشاركين (88.5٪) يعانون من داء السكري النوع الثاني، ويمثل المرضى الذين تتراوح أعمارهم بين 50 عامًا وأكثر (66.3٪) من مرضى السكري. كما أظهرت النتائج أن معدل انتشار الاعتلال العصبي السكري الطرفي بلغ (52%) وكانت له دلالة إحصائية مع مستوى الدخل (P = 0.013)، ومستوى النشاط البدني (P = 0.012) ، والزيارات المنتظمة للأطباء (P = 0.027) ، ومستويات Hb1Ac (P = 0.002) و FBS (P = 0.027). وجد أن الانتشار يزداد في المرضى غير المتعلمين (OR 2.919 ، P = 0.027 7.539 – 1.130 95% CI) والمرضى غير النشطين جسديًا (OR 1.920، P = 0.021 3.345 - 1.102 95% CI).

الاستنتاج: تظهر دراستنا أن أكثر من نصف المشاركين (52٪) يعانون من الاعتلال العصبي السكري الطرفي. وشكلت مستويات HbA1c و FBS المرتفعة، المستوى التعليمي المنخفض، انخفاض الدخل والنشاط البدني، والزيارات غير المنتظمة عوامل خطر مرتبطة بالاعتلال العصبي السكري الطرفي.