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Research Article

Hospital Frequency and Factors Associated with Peripheral Neuropathy in Diabetic Patients at the Libreville Hospital University in 2022

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Abstract

Introduction: Diabetes represents a major public health issue worldwide due to its prevalence and numerous complications. The progression of this chronic disease is marked by complications, the most common of which is peripheral neuropathy. Diabetic peripheral neuropathy results from prolonged exposure of the microcirculation to elevated blood sugar levels. The aim of this study was to determine the prevalence and associated factors of peripheral neuropathy among diabetic patients at the University Hospital Center of Libreville in 2022. *Methods:* This was a cross-sectional, descriptive and analytical study conducted from June 15 to August 15, 2022. The study population consisted of diabetic patients seen in the endocrinology and neurology outpatient departments at university hospital of Libreville during the study period. The presence of peripheral neuropathy was defined based on two assessment tools: the Michigan Neuropathy Screening Instrument (MNSI) and the DN4 questionnaire. *Results:* A total of 301 diabetic patients were included in the study. There was a female predominance, with a sex ratio of 0.5. The mean age of the population was 57.4 ± 12.4 years. The hospital prevalence of peripheral neuropathy among diabetic patients at university hospital of Libreville was 43.2%. Painful forms, assessed using the DN4 score, accounted for 23.9%. *Conclusion:* The study highlights the prominent role of peripheral neuropathy as a complication of diabetes mellitus. Preventive strategies, particularly through glycemic control, appear essential.

Keywords

Diabetic Neuropathy, Prevalence, Associated Factors, Libreville

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1. Introduction

Diabetes is defined as a chronic state of hyperglycemia caused by a defect in insulin secretion or action [1-3]. This condition represents a major public health issue worldwide due to its frequency and numerous complications. Despite several prevention programs, the global prevalence of diabetes continues to rise. Indeed, diabetes figures have reached alarming levels, with 463 million people affected worldwide [4]. Moreover, the prevalence of diabetes is higher in low- and middle-income countries, where 81% of adult diabetics are found [5]. In Gabon, it is estimated at 7% according to the latest studies [6].

The progression of this chronic disease is marked by numerous complications, the most frequent of which is peripheral neuropathy. Authors report that 50% of patients with type 2 diabetes will develop peripheral neuropathy during their lifetime [7-9]. The clinical manifestations of diabetic peripheral neuropathy are mostly dominated by distal and symmetrical polyneuropathy, often with sensory involvement. However, in some cases, these sensory symptoms may be associated with motor and/or autonomic signs of varying severity [7, 10-14]. The prevalence of diabetic peripheral neuropathy varies greatly due to the diversity of diagnostic methods and criteria used. It ranges between 5% and 60% at the time of diagnosis and appears to remain stable around 50% after 15 years of disease progression [11, 12, 15].

In India, a study conducted in 2014 found a prevalence of peripheral neuropathy of 29.2% [11]. In Niger, it was 46.0% in 2015, and 39.4% in Togo in 2019 [12, 16, 17]. In Gabon, the prevalence of peripheral neuropathy in the general population was estimated at 2.8% in 2022 [18]. The specific features of peripheral neuropathies have been studied among people living with HIV and hemodialysis patients, with reported prevalence's of 32.7% and 27.4%, respectively [6, 19, 20]. However, the lack of data concerning the prevalence of peripheral neuropathy in diabetic patients was the motivation for conducting this study.

2. Patients and Methods

This was a cross-sectional study with descriptive and analytical aims, conducted from June 15 to August 15, 2022. The study population consisted of diabetic patients seen in endocrinology and neurology consultations at the University Hospital Center of Libreville during the study period.

Diabetic patients followed at the University hospital of Libreville, aged over 21 years, present at consultation during the study period, and who gave their free and informed consent were included in the study.

The presence of peripheral neuropathy was defined after confirmation by a neurologist, based on two assessment criteria: the Michigan Neuropathy Screening Instrument (MNSI) and DN4 scores.

The MNSI score was the primary outcome measure and allowed the diagnosis of peripheral neuropathy by the presence, during history and/or clinical examination, of sensorimotor disorders associated or not with abolition or reduction of osteotendinous reflexes, and the absence of central signs. The DN4 is a clinical screening tool used to diagnose the presence of neuropathic pain. This score was then used to define whether the neuropathy was painful or not. Sampling was exhaustive. All diabetic patients meeting the inclusion criteria were systematically recruited.

Peripheral neuropathy was defined for any patient with a positive MNSI score, which consists of 15 questions on history taking (MNSI A) and 10 questions on physical examination (MNSI B). It is the most feasible and valid test for diagnosing peripheral neuropathy. The test was considered positive when the patient scored ≥7/15 on the history questionnaire and/or ≥2/10 on the physical exam. Neuropathic pain was assessed with the "Douleur Neuropathique 4" (DN4) questionnaire, which is the most reliable test for diagnosing neuropathic pain. It includes 10 questions, and a score ≥4/10 indicates the presence of neuropathic pain.

Statistical analysis of the collected data was performed using Epi Info software, version 7.1.5.2, published in 2018. Proportions were calculated to describe qualitative variables. Means with standard deviations and medians with interquartile ranges were calculated respectively for quantitative variables with symmetric distribution and for quantitative variables with asymmetric distribution (assessed by the Shapiro-Wilk test). The significance threshold was set at $p < 0.05$.

Approvals were obtained from the management of university hospital of Libreville, and the heads of the Neurology and Endocrinology departments. Measures were taken to ensure that the implementation and conduct of the study guaranteed patient data confidentiality.

3. Results

Among the 1,011 patients seen in neurology and endocrinology during the study period, 301 diabetic patients were included. Of these, 191 (63.5%) were female and 110 (36.5%) were male, resulting in a sex ratio of 0.58. Patients' ages ranged from 21 to 87 years, with a mean age of 57.4 ± 12.4 years. The age group 50 to 60 years was the most represented, accounting for 31.2%. Nearly one in two patients lived as a couple or had a secondary school education level.

Overall, 59.8% of patients had abnormally high blood pressure. The average capillary blood glucose level was 172 ± 97mg/dl. It was above 250mg/dl in 19.3% of patients. The average Body Mass Index (BMI) was 27.9 kg/m². The proportions of overweight and obese patients were 33.6% and 32.2%, respectively. On the clinical level, the most common subjective symptoms were tingling sensations (43.2%), burning sensations (33.9%), and numbness (32.2%). Deep

sensitivity disorders (70%) and reflex abnormalities (45.7%) were the main clinical findings. A description of the clinical features of peripheral neuropathy (PN) based on the DN4 showed a predominance of burning sensations (50.8%), tingling sensations, and touch hypoesthesia, which were present in 63.1% and 64.6% of patients with PN, respectively.

Among the 301 patients included, 97% had type 2 diabetes. The average duration of diabetes was 9 ± 7 years, ranging from 1 to 40 years. Most patients had been living with diabetes for more than one year, representing 82.1%.

The average glycated hemoglobin level was 8.3 ± 2.7. Diabetes was well controlled in 14.6% of patients. Most patients were taking oral antidiabetic drugs (OADs), although 10% were not receiving any diabetes treatment. Among those on treatment, 14.3% were on both OADs and insulin. A total of 52.2% of patients were following dietary and lifestyle measures.

Among the 301 patients, 57.1% had a known history of hypertension, 24.9% presented with dyslipidemia, and 4% were current smokers. Among smokers, the mean tobacco exposure was 21.5 ± 33.2 pack-years, with a range of 3 to 120 pack-years; 25% of smokers had a consumption exceeding 20 pack-years. Alcohol consumption was reported by 40.5% of patients, with a mean intake of 115.9 ± 246.6 grams per day over an average duration of 32 ± 17 years.

Among the patients, erectile dysfunction was predominant in 64.6% of men, while diabetic nephropathy and diabetic retinopathy were observed in 3.3% and 3.7% of patients, respectively.

Among diabetic macroangiopathic complications, strokes (7.3%) were the most frequent, followed by peripheral arterial disease of the lower limbs and ischemic heart disease.

Eight patients (2.7%) were HIV-positive, and eight (2.7%) had renal failure. Treatment with medications known to potentially induce peripheral neuropathy was reported in 66.8% of patients. Metformin was the most commonly used drug among the patients.

3.1. Hospital Frequency of Peripheral Neuropathy

Among the 301 patients surveyed, 130 had a positive score on the MNSI A, MNSI B, or DN4 tests. The frequency of peripheral neuropathy was 43.2%.

According to the screening tools, the frequency of pain neuropathy was 23.9% based on the DN4.

3.2. Bivariate Analysis

1) Sociodemographic Characteristics and Peripheral Neuropathy

The frequency of peripheral neuropathy was higher among women (45.5%). However, the association between sex and peripheral neuropathy was not statistically significant (p = 0.276). Age was significantly associated with peripheral neuropathy (p = 0.017). The frequency of peripheral neuropathy was higher in patients over 70 years old (58.7%). These characteristics are shown in Table 1.

Table 1. *Distribution of patients by socio-demographic characteristics and peripheral neuropathy, Libreville in 2022.*

	Total (N)	**NP+**		**p**	**RC**	**CI 95%OR**	
		n	**(%)**				
Gender							
Female	191	87	(45,5)	0,276	1,3	0,8	2,1
Male	110	43	(39,1)		1		
Age (year)							
21-40	26	5	(19,2)		1		
40-50	44	16	(36,4)		2,4	0,8	7,6
50-60	94	44	(46,8)	0,017	3,7	1,3	10,6
60-70	91	38	(41,8)		3,0	1,0	8,7
≥ 70	46	27	(58,7)		6,0	1,9	18,6
Marital status							
Lives with a partner	159	68	(42,8)	0,876	1		
Lives alone	142	62	(43,7)		1,0	0,7	1,6
Profession							

	Total (N)	NP+ n	(%)	p	RC	CI 95%OR	
Employee	81	29	(35,8)		1		
Retailer	32	12	(37,5)		1,1	0,5	2,5
Retired	74	34	(45,9)	0,116	1,5	0,8	2,9
Unemployed	110	55	(50,0)		1,8	1,0	3,2
Student	4	0	(0,0)		-	-	-
Education level							
No	36	18	(50,0)		2,5	1,0	6,0
Primary	58	30	(51,7)		2,6	1,2	5,8
Secondary	155	67	(43,2)	0,08	1,9	1,0	3,7
University	52	15	(28,8)		1		

2) Blood Pressure, Glycemic, and Anthropometric Characteristics

Blood pressure, glycemic, and anthropometric profiles were not significantly associated with peripheral neuropathy. However, the frequency of peripheral neuropathy was higher among hypertensive patients, those with blood glucose levels above 250mg/dl, and patients who were underweight, as shown in Table 2.

Table 2. *Distribution of patients according to peripheral neuropathy and blood pressure, glycemic, and anthropometric characteristics, Libreville, 2022.*

	Total (N)	NP+ n	(%)	p	RC	CI 95%OR	
Blood pressure							
Normal	121	52	(43,0)	0,951	1		
High	180	78	(43,3)		1,0	0,6	1,6
HTA							
No	180	76	(42,2)	0,679	1		
Yes	121	54	(44,6)		1,1	0,7	1,8
Capillary blood glucose (mg/dL)							
<110	91	34	(37,4)		1		
110-180	118	52	(44,1)	0,498	1,3	0,8	2,3
180-250	36	16	(44,4)		1,3	0,6	2,9
≥ 250	56	28	(50,0)		1,7	0,9	3,3
BMI (kg/m²)							
Overweight	101	39	(38,6)		1		
Obese	97	41	(42,3)	0,495	1,2	0,7	2,1
Normal	98	47	(48,0)		1,5	0,8	2,6
Slim	5	3	(60,0)		2,4	0,4	14,9

3) Diabetes History

The type of diabetes was borderline significant in its association with peripheral neuropathy (p = 0.051). The duration of diabetes was significantly associated with peripheral neuropathy (p = 0.012). Furthermore, the risk of developing peripheral neuropathy increased significantly with the duration of diabetes (p = 0.002).

Regarding follow-up frequency, the prevalence of neuropathy was higher among patients who were followed only once a year (61.1%) or only in the event of complications (56.4%). Follow-up frequency was borderline significantly associated with neuropathy (p = 0.058).

In terms of treatment regimen, patients who had stopped treatment (including lifestyle and dietary measures) were 2.3 times more likely to develop peripheral neuropathy than those who were undergoing treatment. Patients on insulin alone had a 70% higher risk of developing peripheral neuropathy compared to those not receiving insulin therapy. Table 3 presents the association between patients' diabetes profiles and peripheral neuropathy.

Table 3. *Distribution of patients according to peripheral neuropathy and diabetes profile, Libreville 2022.*

	Total (N)	**NP+**		**p**	**RC**	**CI $_{95\%}$OR**	
		N	**(%)**				
Type of diabetes							
Type 1	6	1	(16,7)		1		
Type 2	292	126	(43,2)	0,051	3,8	0,4	32,9
Other	3	3	(100,0)		-	-	-
Age of diabetes							
Former	247	115	(46,6)	0,012	2,3	1,2	4,3
De novo	54	15	(27,8)		1		
Development time (year)							
< 1	54	15	(27,8)		1		
1-5	102	38	(37,3)		1,5	0,8	3,2
6-10	71	33	(46,5)	0,002	2,3	1,1	4,8
11-15	35	18	(51,4)		2,8	1,1	6,7
≥ 16	39	26	(66,7)		5,2	2,1	12,7
Diabetes monitoring							
No	51	15	(29,4)		1		
Every 3 months	181	77	(42,5)		1,8	0,9	3,5
At least once every six months	12	5	(41,7)	0,058	1,7	0,5	6,3
At least once a year	18	11	(61,1)		3,8	1,2	11,6
Complications	39	22	(56,4)		3,1	1,3	7,4
Diabetes treatment							
No	30	8	(26,7)	0,054	2,3	1,0	5,2
Diet	157	73	(46,5)	0,226	1,3	0,8	2,1
OAD	224	91	(40,6)	0,126	1,5	0,9	2,5
Insulin	85	45	(52,9)	0,032	1,7	1,0	2,9
OADs-Insulin	43	17	(39,5)	0,601	0,8	0,4	1,6
Glycemic balance (%)							
≤ 7	89	34	(38,2)	0,368	1		

	Total (N)	NP+ N	(%)	p	RC	CI 95%	OR
> 7	117	52	(44,4)		1,3	0,7	2,3

4) Cardiovascular Risk Factors

The prevalence of peripheral neuropathy was higher among hypertensive patients (44.8%). Dyslipidemia was significantly associated with PN (p = 0.041). Patients with dyslipidemia were 1.7 times more likely to present with PN, as shown in Table 4.

Table 4. *Distribution of Patients According to Peripheral Neuropathy and Cardiovascular Risk Factors, university hospital 2022.*

	Total (N)	NP+ n	(%)	p	RC	CI 95%	OR
HTA							
No	129	53	(41,1)	0,523	1		
Yes	172	77	(44,8)		1,2	0,7	1,8
Dyslipidemia							
No	226	90	(39,8)	0,041	1		
Yes	75	40	(53,3)		1,7	1,1	2,9
Smoking							
No	289	127	(43,9)	0,243	1		
Yes	12	3	(25,0)		0,4	0,1	1,6
Alcohol							
No	179	82	(45,8)	0,266	1		
Yes	122	48	(39,3)		0,8	0,6	1,1

NP+: Presence of Peripheral Neuropathy, HTA: Hypertension. RR: Rib Ratio

5) Degenerative Complications

Among the microangiopathic complications, only a history of diabetic neuropathy was significantly associated with current peripheral neuropathy (p=0.0).

Table 5. *Distribution of Patients According to Peripheral Neuropathy and Diabetic Microangiopathic Complications, university hospital, 2022.*

	Total (N)	NP+ n	(%)	p	RC	CI 95%	OR
Diabetic retinopathy							
No	291	125	(43,0)	0,658	1		
Yes	10	5	(50,0)		1,3	0,4	4,7

	Total (N)	NP+ n	(%)	p	RC	CI 95% OR	
Diabetic nephropathy							
No	290	127	(43,8)	0,361	1		
Yes	11	3	(27,3)		0,5	0,1	1,9
Erectile dysfunction							
No	39	14	(35,9)	0,611	1		
Yes	71	29	(40,8)		1,2	0,5	2,8
Stroke							
No	279	119	(42,7)	0,503	1		
Yes	22	11	(50,0)		1,3	0,6	3,2
Ischemic heart disease							
No	293	127	(43,3)	1	1,3	0,3	5,4
Yes	8	3	(37,5)		1		
PAOD							
No	290	120	(41,4)	0,001	1		
Yes	11	10	(90,9)		14,2	1,8	112,1

Regarding macroangiopathic complications, the frequency of peripheral neuropathy was higher in patients who had experienced a stroke (50.0%). However, the association between stroke and peripheral neuropathy was not statistically significant (p=0.503). Conversely, lower limb peripheral arterial disease (PAD) was significantly associated with peripheral neuropathy (p=0.001). Patients with PAD were 14.2 times more likely to develop peripheral neuropathy compared to those without it. Table 5 summarizes the association between peripheral neuropathy and diabetic complications.

6) Other Medical Histories

The prevalence of peripheral neuropathy (PN) was higher among people living with HIV (75.0%); however, the association was not statistically significant (p = 0.08).

In contrast, the association between chronic kidney disease (CKD) and PN was statistically significant (p = 0.023). Patients with CKD were 9.7 times more likely to develop PN compared to those without.

Multivariate Analysis

Patient age, duration of diabetes, a history of diabetic neuropathy, peripheral arterial disease (PAD), and HIV infection were identified as significant predictors of peripheral neuropathy in diabetic patients. Table 6 presents the multivariate model of factors associated with peripheral neuropathy after adjustment for confounding factors and control for effect modifiers.

Table 6. *Factors Associated with Peripheral Neuropathy in Diabetic Patients — Multivariate Model, Libreville, 2022.*

	Adjusted RC	CI 95% OR adjusted		p
Age (year)				0,049
21-40	1			
40-50	1,9	[0,6	6,8]	0,294
50-60	2,7	[0,8	8,4]	0,097
60-70	2,6	[0,8	8,2]	0,106
≥ 70	3,7	[1,1	13,1]	0,045

	Adjusted RC	CI $_{95\%}$OR $_{adjusted}$		p
Development time (year)				0,003
<1	1			
1-5	0,9	[0,4	2,1]	0,879
6-10	1,4	[0,6	3,2]	0,437
11-15	1,8	[0,7	4,7]	0,226
≥ 16	3,6	[1,3	10,2]	0,017
History of diabetic neuropathy				
No	1			
Yes	11,4	[4,1	31,5]	0,000
PAOD				
No	1			
Yes	11,0	[1,3	95,9]	0,030
HIV				
No	1			
Yes	4,8	[0,8	29,8]	0,089
R ²(%)	27,36			

4. Discussion

This study conducted at the university hospital of Libreville aimed to determine the hospital prevalence and associated factors of peripheral neuropathy in diabetic patients However, our study has some limitations. In particular, the exclusion of alcohol use and medications known to induce peripheral neuropathies from the differential diagnosis and analysis.

4.1. Prevalence of Peripheral Neuropathy in Diabetic Patients

In this study, the prevalence of peripheral neuropathy among diabetic patients was 43.2%. This figure was established based on the MNSI and DN4 scores. These findings are consistent with results reported in various regions across the globe. Indeed, in Sub-Saharan Africa, particularly in West Africa, Traor éD et al. (2013) in Mali [21] and Mahamane S et al. (2015) in Niger [12] reported prevalences of 43.2% and 46%, respectively. In North Africa, Oueslati et al. (2018) in Tunisia [22] and Aynaou H et al. (2019) in Morocco [14] reported similar rates of 43%. In the Middle East, Khawaja et al. (2018) in Jordan [23] found a prevalence of 39.5%.

Other studies have reported different results. For instance, Lahmar B et al. (2017) [13] found a lower prevalence of 15.3%. In South Asia, particularly in India, Bansal et al. (2014) reported a prevalence of 29.2% [16], while Ponirakis et al. (2020) in Qatar reported a rate of 23% [24]. In Europe, Domenico et al. (1997) in Italy found a prevalence of 32.3% [25].

This variation in results may be explained by differences in diagnostic methods and assessment tools (judgment criteria), as well as differences in the target populations and sample sizes across studies.

Indeed, as in our study, Mahamane S. et al. used the MNSI and DN4 scores as assessment criteria. In contrast, Lahmar B. et al. used only the DN4 score, while Bansal et al. relied on the 10g monofilament, pinprick sensitivity, Achilles tendon reflexes, and vibration perception. Ponirakis et al. used the presence of symptoms along with a vibration perception threshold greater than 15V, whereas Domenico et al. employed other scores.

Moreover, the large sample sizes used by Bansal et al. (2,006 participants), Ponirakis et al. (1,086), and Domenico et al. (8,757) may account for the differences observed. Finally, it is worth noting that Ponirakis et al., Bansal et al., and Khawaja et al. included only patients with type 2 diabetes in their respective studies.

Regarding the prevalence of painful peripheral neuropathy, it was 23.9% based on the DN4 score in this study. This result is consistent with findings from Nejmeddine et al. in Morocco (26.3%) [26], Aouiche et al. in Algeria (22.5%) [27], Mahamane S. et al. in Niger (26%), and Ayfer et al. in Turkey (22.9%) [28]. In contrast, a meta-analysis conducted by Jambart et al. in the Middle East in 2011 reported a significantly higher prevalence of 53.7% [29]. This discrepancy

may be attributed to cultural diversity and, more importantly, to differences in inclusion criteria compared to our study.

Indeed, the inclusion criteria of the present study comprised age over 18 years, attendance at outpatient consultation, a confirmed diagnosis of type 1 or type 2 diabetes for more than 5 years, the absence of psychiatric disorders (or any other condition that could bias questionnaire responses), and the absence of other diseases known to cause peripheral neuropathy (e.g., herpes, cancer, trigeminal neuralgia, fibromyalgia, etc.). Moreover, the study by Jambart et al. used an Arabic-translated version of the DN4 questionnaire, which may have led to comprehension difficulties due to the similarity of the symptoms assessed (e.g., tingling and pins-and-needles sensations may be easily confused). Garoushi et al., in Libya [30], also reported a different prevalence (44.2%), which may be attributed to the use of a different diagnostic tool, namely the S-LANSS score.

4.2. Clinical Characteristics

The mean BMI in this study was 27.9kg/m². This result is consistent with those reported by Lahmar B *et al*. [13] (27.53kg/m²), Garoushi et al. [30] (29.5kg/m²), and Jambart *et al*. [29] (29.4 kg/m²) and was slightly lower than that found by Khawaja et al. [23]. Additionally, the proportions of overweight and obese patients in our study were 33.6% and 32.2%, respectively similar to the findings of Traore D *et al*., who reported 34% overweight and 37% obesity. In contrast, the study by Lahmar *et al*. reported 21.3% obesity and 59.3% overweight.

In this study, 130 out of 301 patients (43%) were diagnosed with peripheral neuropathy (PN). Among these patients, the most commonly reported subjective symptoms were tingling (63.1%), burning sensations (50.8%), numbness (47.7%), and pins-and-needles sensations (41.5%). These findings are comparable to those of Mahamane S. et al. [12], who reported burning (57%), pins and needles (50%), tingling (44.5%), and numbness (32%) in descending order of frequency.

Similarly, Jambart *et al.* [29] reported burning sensations in 59.3% of patients, numbness in 57.4%, tingling in 47%, and pins and needles in 42%.

According to the screening tool used, tactile hypoesthesia was the most frequent clinical sign identified using the DN4 score, present in 31.9% of the total study population (N = 301) and in 64.6% of those with PN (n = 130). Jambart et al. [29] also found tactile hypoesthesia (26.9%) to be the most common clinical sign based on the DN4 score.

According to the MNSI, the most frequent clinical signs observed in our population were abnormal reflexes (45.7%), insensitivity to the monofilament test (33.5%), and impaired deep vibratory sensation (30%) [31]. Monofilament insensitivity indicates an increased risk of foot ulceration. This sign was present in 29% of patients in the study by Mahamane S. *et al.* [12].

In comparison, Khawaja et al. [23] reported monofilament insensitivity (78.5%), trophic disorders (74%), and impaired vibratory sensation (66%) as the most frequent clinical signs. Although the types of abnormalities and their order of frequency were similar between our study and that of Khawaja et al., the higher proportions in their findings can be explained by the fact that their assessments were limited to patients already diagnosed with peripheral neuropathy.

4.3. Factors Associated with Peripheral Neuropathy

In our study, the factors significantly associated with peripheral neuropathy were advanced age ($p = 0.017$), duration of diabetes ($p = 0.012$), type of diabetes treatment ($p = 0.032$), dyslipidemia ($p = 0.041$), a history of diabetic neuropathy, and peripheral arterial occlusive disease (PAOD) ($p = 0.030$).

These findings are consistent with those reported in the literature. Indeed, Mahamane S. et al. identified age, male sex, type 2 diabetes, and duration of diabetes as associated factors. Khawaja et al. found advanced age, occupation, physical activity, duration of diabetes, hypertension, a history of peripheral neuropathy, cardiovascular risk factors, dyslipidemia, and type of diabetes treatment to be significantly associated. Similarly, Bansal et al. reported associations with alcohol consumption and microangiopathic complications.

The mean age in our study was 57.4 ±12.4 years, with 61.4% of patients between 50 and 70 years old, and 15.3% over 70 years. Similar findings were reported by Lahmar B. et al., with a mean age of 57.24 ±9.79 years and 69.66% of patients in the 50-70 age range. Likewise, Oueslati I. et al. reported a mean age of 58 years. This trend can be explained by the predominance of type 2 diabetes among the study population, and by the minimum inclusion age in our study (21 years). In comparison, the minimum age of participants in the studies by Lahmar B. et al. and Oueslati I. et al. was 32 and 35 years, respectively, supporting our observation. However, our mean age was higher than that reported by Aynaou H. et al. (48 years) and Mahamane S. et al. (50 years).

5. Conclusion

This study aimed to estimate the hospital prevalence and associated factors of peripheral neuropathy at the University Hospital Center of Libreville in 2022. The findings revealed a prevalence of peripheral neuropathy of 43.2%, with painful forms accounting for 23.9%. The associated factors identified were advanced age, longer duration of diabetes, type of diabetes treatment, dyslipidemia, history of diabetic neuropathy, and peripheral arterial disease.

Our study also highlights the risk of serious complications associated with peripheral neuropathy, particularly foot ulceration. These findings emphasize the importance of preventive measures, especially optimal glycemic control.

Abbreviations

BMI	Body Mass Index
CKD	Chronic Kidney Disease
DN4	Douleur Neuropathique 4
HIV	Human Immunodeficiency Virus
MNSI	Michigan Neuropathy Screening Instrument
OADs	Oral Antidiabetics Drugs
PAD	Peripheral Arterial Disease
PAOD	Peripheral Arterial Occlusive Disease
PN	Peripheral Neuropathy

Author Contributions

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Kouna Ndouongo Philomène: supervision visualization validation

Conflicts of Interest

The authors declare no conflicts of interest.

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