J Neurol Neurosci ©
13 (9) 2022 : 001-004 • RESEARCH ARTICLE

Diabetic distal polyneuropathy in outpatient settings in Togo

Vinyo Kodzo Kumako[1]*, Marleine Dzobosse Watouo[2], Léhleng Agba[1], Kossivi Apetse[2], Damelan Kombate[3], Komi Assogba[2], Mofou Belo[4], Ayelola Balogou[2]

[1]Department of Neurology, CHU of Kara, BP.18, Kara, Togo
[2]Department of Neurology, CHU Campus, BP 30284, Lomé, Togo
[3]Neurology Service of the CHR of Kara, BP.18, Kara, Togo
[4]Neurological Clinic, CHU OLYMPIO, BP 57 Lomé, Togo

SUMMARY

Introduction: In sub-Saharan Africa, diabetes is on the rise. The most frequent clinical form of diabetic neuropathy is distal polyneuropathy characterized by its bilateral, synchronous, and distal systematization in the limbs. Data on this clinical form are rare or even non-existent as in Togo.

Objectives: To describe the epidemiological, clinical, and electrophysiological profile of diabetic distal polyneuropathy in Togo.

Setting and method: A descriptive study with prospective data collection, carried out over a period of 6 months (March 1 to August 31, 2020) included patients seen in neurology and diabetology consultations at the two university hospitals of Lomé during the study period and in whom the diagnosis of diabetic distal polyneuropathy had been retained. The Michigan Neuropathy Screening Instrument (MNSI) was used to establish the diagnosis and neuropathic pain was diagnosed on the basis of the DN4 score.

Results: A total of 101 patients met the inclusion criteria. The mean age was 58 ± 10 years, with a sex ratio M/F of 0.84. High blood pressure was the main cardiovascular risk factor (63.4%). Type 2 diabetes was the most common (98%) and 70.3% had unbalanced diabetes. Distal polyneuropathy revealed diabetes in 8.9% of cases. The mean time to onset of distal polyneuropathy symptoms from the date of diabetes diagnosis was 1.8 ± 2.4 years, with extremes of 14 days and 10 years. The pain was the most represented sensitive symptomatology (75.2%). The DN4 score was greater than 4 in 90.8% of patients, and 25% of patients had non-painful sensory symptomatology. No patient had a motor deficit. The monofilament test was abnormal in 74.3% of cases. Electromyographically, 34.5% of the patients had a sensory-motor-dependent chronic axonal form and 65.5% had an axon-myelin form. Group B vitamins (58.4%) and tricyclic antidepressants (26.7%) were the main therapeutic options. The severity of diabetic distal polyneuropathy was correlated with dyslipidemia, glycemic imbalance, diabetic retinopathy, and erectile dysfunction.

Conclusion: The relatively rapid onset of neurological complications is evidence that proper monitoring of diabetic patients is crucial to preventing the occurrence of diabetic distal polyneuropathy. The therapeutic strategies currently used in the symptomatic treatment indicate that there are real problems with management.

Keywords: Diabetes; Distal polyneuropathy; Neuropathic pain; Paresthesia; Electroneuromyogram; Togo

Address for correspondence:

Vinyo Kodzo Kumako
Department of Neurology, CHU of Kara, BP.18, Kara, Togo
E-mail: kuvinkov@hotmail.com

Word count: 2264 **Tables:** 00 **Figures:** 00 **References:** 24

Received: 08.09.2022, Manuscript No. ipjnn-22-13049; **Editor assigned:** 10.09.2022, PreQC No. P-13049; **Reviewed:** 19.09.2022, QC No. Q-13049; **Revised:** 23.09.2022, Manuscript No. R-13049; **Published:** 30.09.2022

INTRODUCTION

Diabetes defined as a group of heterogeneous metabolic diseases characterized by a state of chronic hyperglycemia is the leading cause of neuropathy in the world [1]. In sub-Saharan Africa, diabetes is on the rise due to the changing lifestyle of the population. The number of diabetics in sub-Saharan Africa has been estimated at 24 million adults in 2021. It is estimated that this number will increase to 33 million in 2030 and to 55 million in 2045 [2]. Togo, where the national prevalence of diabetes was estimated at 2.6% in 2010 [3], is not immune to this expansion. This increase favors a parallel rise in the number of disabling and potentially serious complications, the most frequent of which are diabetic neuropathies (DN) [4]. Diabetic polyneuropathy is defined as peripheral nerve damage localized to the lower limbs due to metabolic and microvascular alterations secondary to chronic hyperglycemia, after excluding other causes of neuropathy [4]. It is characterized by its bilateral, synchronous, and distal systematization. The prevalence of distal polyneuropathy increases with the duration of diabetes, especially beyond 5 years in type 2 diabetes [5]. It is estimated, however, that 50% of patients have neuropathy after 25 years of diabetes and that 7.5% of patients have symptomatic neuropathy at the time of discovery of diabetes [6]. Harris et al reported manifestations of sensory polyneuropathy in 30-40% of diabetics in the United States [7]. A study carried out in Belgium on more than 1100 diabetic patients followed A study carried out in Belgium on more than 1100 diabetic patients followed in 40 specialized centers noted that 43% of diabetic patients presented distal sensitive polyneuropathy [8]. In sub-Saharan Africa, Mahamane et al. [9] in Niger found a prevalence of 46%. Often asymptomatic, it is a serious complication, which can be prevented, delayed, and treated symptomatically. It is associated with a higher mortality rate in diabetics and a high risk of potentially severe, life-threatening podiatric complications. They are responsible for an alteration in the quality of life and have a significant socio-economic impact [10].

In Togo, data on distal diabetic polyneuropathy (DDP) are rare. It is in this context that we carried out this work whose aim was to describe the characteristics of DNP in Togo.

METHODS

This was a descriptive study with prospective data collection, conducted from March 1 to August 31, 2020. It took place in the neurology departments of the University Hospitals of Lomé and in the diabetes department of the Sylvanus Olympio University Hospital (SO) of Lomé. All diabetic patients were systematically selected to participate in this study. They presented symmetrically and bilaterally sensory symptoms such as paresthesia, dysesthesias in the form of burning sensations, and stabbing pain located distally in the lower and/or upper limbs. The diagnosis of PND was made on the basis of a Michigan Neuropathy Screening Instrument (MNSI) score greater than 2.5 [11]. Electro physiologically, an abnormality in one of the parameters of the study of nerve conduction in two different nerves, including the sural nerve, was retained as the minimum criterion for the diagnosis of PND. The data collection was made from the information collected on the investigation forms established beforehand, including information about the patient, his disease, the result of the clinical examination, and the paraclinical data. After explaining the nature of the study and having the patient's verbal consent, we proceeded with interrogation and physical examination that allowed us to characterize neuropathic pain using the DN4 score and evaluate the MNSI. Four groups of study variables were used: epidemiological variables (age, sex, occupation), clinical variables: body mass index (BMI), characteristics of diabetes (circumstance of discovery, family history, type, treatment, follow-up, associated cardiovascular risk factors, and other complications of diabetes), sensory symptoms evaluated using the DN4 Score, motor symptoms, and neurological deficits with the assessment of the MNSI, Paraclinical variables: glycated hemoglobin, fundus examination, lipid panel, microalbuminuria, brain scan, electroneuromyogram, Therapeutic variables: symptomatic treatment of PND.

The completed questionnaires were checked for completeness and consistency before entry. The data were recorded in a data entry mask created under Epidata V3.1 and then exported to the R© software version 1.3.959 for analysis. For descriptive analysis, quantitative variables were described by means (standard deviation) and qualitative variables by absolute and relative frequencies.

RESULTS

Of a total of 101 patients meeting our inclusion criteria, 55 were female: with a sex ratio M/F of 0.84. The mean age was 58 ± 10 years, with extremes of 27 and 80 years. The most represented age groups were 60 to 70 years and 50 to 60 years, with proportions of 37.6% and 35.6%, respectively. Hypertension was found in 64 patients (63.4%) and 53 patients (52.5%) had dyslipidemia. Type 2 diabetes was found in 99 patients (98%). One patient had cortico-induced diabetes and one had gestational diabetes. No patient had type I diabetes. Diabetes was discovered incidentally in 51 patients (50.5%). Distal polyneuropathy had revealed diabetes in 9 patients (8.9%). In 75 patients (74.3%), medical follow-up was irregular. A family history of diabetes was found in 53 patients (52.5%). Family status was unknown in 7 patients (6.9%). Diabetic retinopathy, ischemic stroke, and nephropathy were the most common microangiopathic complications, with a frequency of 33.7% (34 patients), 18.8% (19 patients), and 14.9% (15 patients), respectively. Of the 101 patients, 87 (86.1%) were on antidiabetic treatment and 14 patients were not on antidiabetic treatment. All patients had achieved All patients had performed glycated hemoglobin. The mean glycated hemoglobin was 8.9% ±1.7, with extremes of 5.6 and 12%. Of all patients, 13.7% (n=14) had normal glycated hemoglobin. The mean time to onset of PND symptoms from the date of diabetes diagnosis was 1.8 ± 2.4 years. Clinical, electromyographic, and therapeutic examination data are summarized in **Tab. 1**.

Tab. 1. Electrophysiological and therapeutic clinical examination data of 101 patients.

Clinical Examination	Number	Percentage (%)
Evaluation of neuropathic pain		
Painful symptoms (DN4 score)	76	75,2
DN4 score between 1 and 3	7	9,2
DN4 score ≥ 4	69	90,8
Characteristics of the pain		
Burning	95	94,7
Sensation of painful cold	19	18,8
Electrical discharges	40	25
Symptoms associated with pain		
Tingling		63,4
Numbness		22,8
Itching		8,9
Pain increased by friction Pain increased by friction		48,5
Motor symptoms		
Cramps	49	48,5
Painful symptoms (DN4 score)	76	75,2
Monofilament test	101	100
Normal	26	25,7
abnormal	75	74,3
Proprioceptive ataxia	101	100

Absent	76	75,2
Present	25	24,8
Vibratory sensitivity	101	100
Absent	42	41,6
Decreased	44	43,6
Normal	15	14,9
Achilles reflexes	101	100
Absent	56	56,0
Decreased	43	43,0
Normal	2	2,0
Electrophysiological findings in 44 patients who underwent electroneuromyograms		
Chronic axonal polyneuropathy length	4	9,1
sensitive dependent	11	25,0
Chronic axonal polyneuropathy length	29	65,9
Type of treatment received by the patients for diabetic polyneuropathy		
Group B vitamin	59	58,4
Amitryptilline	27	26,7
Carbamazepine	20	19,8
Pregabalin	18	17,8
Gabapentin	6	5,9
Clonazepam	2	2
Tramadol	1	1

DISCUSSION

This study, which we conducted over a period of six months, has some biases, notably non-exhaustiveness, lack of financial means of the patients reducing the practice of explorations, insufficient technical platform necessary for the realization of complementary examinations for diagnostic purposes, and loss or forgetting of some data by the patients. We found a predominance of women, a result similar to those found in the literature [9,12,13]. The average age of the patients in our study was 58 years. This result is close to that found by Adoukonou et al [14], Mossi et al. [15], and Djibril et al. [16] who reported respectively a mean age of 57.2, 55.9, and 60.7 years. More than half of the patients were overweight or obese in our study. Djibril et al. [16] noted that 21% of their patients were obese. These high proportions could be explained by the current sedentary lifestyle of the population and the increased consumption of saturated fats. The latter were also factors in the onset of obesity and the development of type 2 diabetes, the prevalence of which was high in our study. The main cardiovascular risk factor found was hypertension. This finding was also reported by Mossi et al. [15]. The presence of hypertension increased the risk of developing PND [17]. Dyslipidemia was present in more than half of the patients. It occurs largely in non-insulin-dependent diabetics. This predominance is consistent with some data in the literature [18]. This could be explained by the fact that type 1 diabetes is often underdiagnosed and its prevalence has been much less studied than type 2 diabetes, which remains the most frequent type of diabetes worldwide (85 to 90%) according to the WHO [19]. A family history of diabetes was found in 52.5% of patients with distal polyneuropathy. This proportion is higher than that found by Mossi et al [15] who noted in their series that 31.2% of patients had a family history of diabetes. This high proportion in our study could be explained by the fact that almost all the patients were type 2 diabetics. In the literature, insulin resistance in type 2 diabetes occurs in a genetic background [20]. Erectile dysfunction was present in 11.9% of cases in our study. This proportion is lower than that found by Mahamane Sani et al. [8] who noted a prevalence of 67.6%. This difference could be related to the fact that some patients did not report their erectile dysfunction in our series. A glycemic imbalance was noted in 70.3% of patients in our series. Mahamane et al. [8] reported that 89.6% of patients had unbalanced diabetes. This high proportion can be explained by the lack of respect for hygienic and dietetic measures observed in the population, the lack of therapeutic compliance, and/or the lack of financial means to pay for the treatments. The average time to onset of PND symptoms in our study was 1.8 ± 2.4 years. Adoukonou et al. [14] noted a mean time to onset of PND of 12.5 years. Mahamane et al [8] found a delay of 5 years or more in 58% of their patients. The frequency of PND increases with the duration of diabetes, especially after five years of evolution in type 2 diabetes [21]. This rapid delay in our study can be explained by the fact that diabetes had been evolving for a long time before its diagnosis and was not known by the patients. The DN4 questionnaire remains the validated tool for the detection and quantification of neuropathic pain and is recommended by the French High Authority for Health [12]. In our study, neuropathic pain was confirmed in 90.8% of patients (DN4 score>4). Our results agree with those of the literature [8,9,13]. This proportion can be explained by the fact that almost all of our patients were type 2 diabetics, and half of the patients had unbalanced diabetes. Moreover, it has been shown by several studies [10,22] that the negative impact of neuropathic pain in type 2 diabetics was important on the quality of life of the patients and therefore constituted a frequent complaint in consultation. No patient presented a motor deficit in our study. Predominantly motor forms are exceptional in

PND and their presence should make us fear a very severe form or another diagnosis [23]. Electromyographically, all patients had the axonal form, 65.5% of which had the axon-demyelinating form. We did not find a pure demyelinating form. Adoukonou et al. [14] reported in their 2008 series, that 30.6% demyelinating form and 25.2% axonal form. In terms of therapy, we have reported the association of group B vitamins in the majority of patients. Didangelos et al in their study demonstrated the positive effect of the use of vitamin B12 in the treatment of diabetic polyneuropathy [24]. This high prescription of B vitamins in our study demonstrates the lack of knowledge of some practitioners regarding the treatment of DNP. Amitriptyline was used in 26.6% of cases in our study. This molecule is inexpensive and has the advantage of being available in drops making it easier to take.

CONCLUSION

This descriptive study with prospective data collection, conducted from March 1 to August 31, 2020, noted that almost all patients in this study had type 2 diabetes and more than half of them had unbalanced diabetes. Women were the most affected and neuropathic pain was a frequent reason for consultation. The axonal form was the main type found on the electroneuromyogram. Group B vitamins and tricyclic antidepressants were the first therapeutic resort. The relatively rapid onset of neurological complications is evidence that proper monitoring of diabetics is crucial to preventing the occurrence of PND. The therapeutic strategies currently used in symptomatic treatment indicate that there are real problems in management.

REFERENCES

1. **Alberti KG, Zimmet PZ.** Definition, diagnosis and classification of diabetes mellitus and its complications. Part 1: diagnosis and classification of diabetes mellitus. Provisional report of a WHO Consultation. *Diabet Med*. 1998;15(7):539-553.
2. Diabetes Atlas 10th Edition Brussels: International Diabetes Federation. 2022.
3. République Togolaise, Ministère de la Santé. Final report of the STEPS survey Togo 2010. Ministry of Health, National Program for the Control of Noncommunicable Diseases. Togo; 2012.
4. **Tesfaye S, Boulton AJ, Dyck PJ, et al.** Diabetic neuropathies: update on definitions, diagnostic criteria, estimation of severity, and treatments. *Diabetes Care*. 2010;33(10):2285-2293.
5. Louis Monnier. Diabétologie; Elsevier Masson 3rd Edition. 2019:361-376.
6. Neurophysiology. Elsevier Masson 3rd Edition. 2019:31-55
7. **Harris M, Eastman R, Gowie C.** Symptoms of sensory neuropathy in adults with NIDDM in the US population. *Diabetes care*. 1993;16(11):1446-1452.
8. **Van Acker K.** Diabete Metabolique. 2009;35:206.
9. **Sani MAM, Djibo IM, Madougou S, et al.** Factors associated with diabetic neuropathy at Lamordé National Hospital (Niamey-Niger). *Health Sci Dis*. 2015;16(4):3.
10. **Diop SN, Diédhiou D.** Diabetes mellitus in sub-Saharan Africa: epidemiological and socioeconomic aspects. *Med Metabolic Dis*. 2015:126.
11. **Herman WH, Pop-Busui R, Braffett BH, et al.** Use of the Michigan Neuropathy Screening Instrument as a measure of distal symmetrical peripheral neuropathy in Type 1 diabetes: results from the diabetes control and complications trial/epidemiology of diabetes interventions and complications. *Diabet Med*. 2012;29(7):937-944.
12. **HAS.** Diagnostic management of peripheral neuropathy. 2007;84-86.
13. **Jensen T, Backondja, Hernadez J, et al.** New perspectives on the management of diabetic peripheral neuropathic pain. *Diab Vasc Dis Res*. 2006;3:108-119.
14. **Magylaurent AT, Gaël GG, Mohamed K, et al.** Electroneuromyographic profile of neuropathies in a population of diabetic patients admitted to a neurophysiology laboratory. *African J Neurol Sci*. 2008;27(2):77-85.
15. **Mossi KE, Balaka A, Tchamdja T, et al.** Prevalence of complications of diabetes mellitus at the clinique médico-chirurgicale du CHU sylvanus olympio de lome. *Revue Africaine Médecine Interne*. 2019;6(1-3):42-48.
16. **Djibril AM, Mossi EK, Djagadou AK, et al.** Diabetic foot: epidemiological, diagnostic, therapeutic and evolutionary aspects at the Clinique Médico-chirurgicale du CHU Sylvanus Olympio of Lomé. *Pan African Med J*. 2018;31(1).
17. **Said G.** Diabetic neuropathies. *EMC Endocrinol Nutri*. 2011;10:366-310.
18. **Papanas N, Ziegler D.** Risk factors and comorbidities in diabetic neuropathy: An update 2015. *Rev Diabet Study*. 2015;12(1-2): 48-62.
19. **Feldman EL, Stevens MJ, Thomas PK, et al.** A practical two-step clinical and quantitative electrophysiological assessment for the diagnosis and staging of diabetic neuropathy. *Diabetes Care*. 1994;17:1281-1289.
20. **Atsumi Y, Matsuoka K, Horiuchi A.** A statistical analysis of the neurological manifestations of Japanese diabetic patients. *Diabetic Microangiopathy*. 1983;3:143-152.
21. **Elliott J, Tesfaye S, Chaturvedi N, et al.** EURODIAB, Prospective Complications Study Group. Large-fiber dysfunction in diabetic peripheral neuropathy predicted by cardiovascular risk factors. *Diabetes Care*. 2009;32(10):1896-900.
22. **Davies M, Brophy S, Williams R, et al.** The prevalence, severity, and impact of painful diabetic peripheral neuropathy in type 2 diabetes. *Diabetes Care*. 2006;29(7):1518-1522.
23. **Barbosa A, Medina J, Ramos E et al.** Prevalence and risk factors of clinical diabetis polyneuropathy in a Portuguese primary health care population. *Diabetes Metab*. 1999;25:35-42.
24. **Didangelos T, Karlafti E, Kotzakioulafi E, et al.** Vitamin B12 supplementation in diabetic neuropathy: A 1-Year, randomized, double-blind, placebo-controlled trial. *Nutrients*. 2021;13(2):395.