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Diabetic Nephropathy: A Study of 35 Cases at the Prefectural Hospital of Siguiri, Guinea: Epidemiological and Clinical Aspects

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Abstract

This is a retrospective study, carried out in the General Medicine Department of the Siguiri Prefectural Hospital, between January 2022 and December 2023, based on the department's hospitalization records. Out of a total of 400 diabetic patients, 35 patients were selected as having diabetic nephropathy (ND). The data was analyzed with the Épi Info software. The prevalence of diabetic nephropathy (ND) was 8.75%. The mean age of patients with ND was 48 ± 10 years. The sex ratio for men to women was 2:1. The male sex was the most represented (62.86% of cases). Glycaemic imbalance (HbA1c > 8.0%) was observed in 70.5% (25) of patients with ND. Nephropathy in diabetic subjects was the cause of 44.9% (16) of all CKDs, it is the first cause of CKD in our study. Glycemic imbalance, hypertension, and metabolic syndrome were the main risk factors and progression of CKD reported in our hospital practice.

Subject Areas

Diabetes & Endocrinology

Keywords

Diabetic Nephropathy, Glycaemic Imbalance, Hypertension, Metabolic Syndrome

1. Introduction

Diabetes is a chronic disease whose severity remains linked, in the long term, to degenerative complications, mainly affecting the microvessels of the nerves, eyes, and kidneys. Its prevalence is constantly increasing worldwide. In 1998, the World Health Organization (WHO) estimated that there were 135 million diabetics in the world; This number is expected to reach 300 million by 2025, or 5% of the world's population. In addition, 75% of the world's diabetics reside in developing countries [1]. According to the latest estimates from the International Diabetes Federation (IDF), the total number of people living with diabetes will increase from 382 million in 2015 to 592 million in 2035 [IDF/IDF data: World Diabetes Atlas 2014.

Among the complications of diabetes, diabetic nephropathy (ND) occupies an important place, and affects about 30% of diabetic subjects according to studies [2]. It occurs after 5 to 10 years of diabetes progression, and is often discovered late, because its evolution is silent for a long time. Its occurrence and progression are thought to be favoured by genetic, environmental, clinical, and biological factors. Effective control of these factors would prevent the occurrence of these factors and slow their progression [2]. Although the vast majority of diabetics do not reach the stage of end-stage chronic kidney disease (ESRD), diabetes has become the leading cause of dialysis: the incidence of CKD due to ND doubled between 1991 and 2001 in the United States [3].

In France, diabetic patients accounted for 22.8% of new IRCT patients treated for dialysis in 2006, *i.e.* as many as those arriving on dialysis due to "arterial hypertension (hypertension) or vascular nephropathy" [4]. ND is also one of the most serious complications of diabetes, as it can, unfortunately, progress to end-stage renal disease (ESRD). ND is, today, the leading cause of ESRD [5] [6].

The aim of this study is to describe the epidemiological and clinical characteristics of patients with ND at the prefectural hospital of Siguiri (Guinea).

2. Methodology

This retrospective, descriptive, and analytical study was carried out in the general medicine department of Siguiri Hospital between January 2022 and December 2024, *i.e.* in 2 years.

Studied parameters:

To assess the glycemic balance of our patients, we opted for the recommendations of the American Diabetes Association. We have set personalized HbA1c goals for each patient. We evaluated the stage of diabetic nephropathy (DN) by measuring 24-hour urinary albumin excretion (UAE) and estimated renal function using creatinine clearance according to the CKD-Epi formula (for chronic kidney disease epidemiology collaboration). Thus, four stages of DN were distinguished: stage 1: negative microalbuminuria (UAE < 30 mg/24 hours), stage 2: positive microalbuminuria (UAE: 30 to 300 mg/24 hours), stage 3: macroalbuminuria (UAE > 300 mg/24 hours), and stage 4: end-stage renal disease defined by a creatinine

clearance of less than 15 ml per minute per 1.73 m^2 of body surface area.

We used the classification of stages of chronic kidney disease from the American recommendations (K/DOQI) [2]. The rate of decline in renal function was calculated using the following formula (ml/min/year): (last eGFR—baseline eGFR)/number of years of follow-up. Hypertension (HTA) was defined as a systolic blood pressure (SBP) ≥ 140 mmHg and/or a diastolic blood pressure (DBP) ≥ 90 mmHg. For blood pressure management, we referred to the recommendations from the European Society of Cardiology and HTA published in 2018, which set a target blood pressure of around 130/80 mm Hg for all diabetic patients with diabetic kidney disease [4].

Dyslipidemia has been defined by a cholesterol level ≥ 2 g/l and/or TG ≥ 1.5 g/l and/or HDL cholesterol below 0.4 g/l in men and below 0.5 g/l in women. For the target goal in LDL cholesterol, we based ourselves on the recommendations of the European Society of Cardiology published in 2016, where diabetic patients with ND were considered at very high cardiovascular risk with a recommended target in LDL cholesterol below 0.7 g/l. Hyperuricemia was considered if uricemia was greater than or equal to 420 µmol/l. Anemia was defined by a hemoglobin level below 12 g/dl in adult females and below 13 g/dl in adult males. [7]. After 10 years of follow-up, we observed the evolution of this diabetic nephropathy (DN) after the implementation of nephroprotective measures. We considered a worsening evolution for patients having at least one criterion among the following three criteria: [8]. Progression to higher stages of diabetic nephropathy—Development of severe or terminal chronic kidney disease—A rate of decline in kidney function ≥ 2 ml/min/year patients were hospitalized, and the diagnosis of DN was retained at discharge.

Inclusion criteria:

Patients with diabetes, hospitalized with complications, including diabetic retinopathy, in whom the search for proteinuria was positive.

Results:

The overall prevalence of diabetic nephropathy (ND) was 8.75%. The typology of diabetes was, in 71.42% (25) of cases, type 2 diabetes (T2D) and in 28.57% (10) of cases, type 1 diabetes (T1D).

The mean age of patients with ND was 55.9 ± 10.4 years, the male/female sex ratio was 2:1. The age and sex distribution is presented in **Table 1**.

According to the level of education, 89.9% of the patients were in school. Among patients with ND, 273 (41.3%)

3. Discussion

In our study, diabetic nephropathy affected a relatively young population where patients under the age of 65 represented 90% of type 2 diabetic patients with an average age of 54 ± 8.7 years, which is consistent with the results of the work of Rossing *et al.* [9] and Bouenizabila *et al.* [10] who worked on patients with an average age of 57 and 55.9 years, respectively. In the present study, after 10 years

Table 1. Distribution of patients diagnosed with diabetic nephropathy in the general medicine department of the prefectural hospital of Siguiri according to sociodemographic characteristics.

Socio-demographic characteristics	Number	Proportion (%)
Age (year)		
18 - 32 years old	6	17.14
33 - 47 years old	10	28.57
48 - 63 years old	14	40
Average age (years)	54 ± 8.7	
Smoking		33%
Wives		37.14%
Men		62.86%
Sex ratio		1.69
Comorbidities		
HTA*		61%
Dyslipidemia		41%
Obesity		51%
Hyper uricemia		8.7%
Anaemia		20.5%

of follow-up, about one-third (30%) of our patients had negative albuminuria and only 3% had developed end-stage chronic kidney disease. A Tunisian observational study of a national dialysis registry, published in 2008, showed that diabetic nephropathy showed an average annual increase of 16.1% between the years 1992-1993 (10.5%) and 2000-2001 (35.0%) [11].

Within our sample, 36% of our patients had an unfavorable evolution of their diabetic nephropathy with a mean time to progression of 6.06 ± 2.24 years. These same results were found in the study by Altemtam *et al.*, which involved 270 type 2 diabetics with chronic kidney disease, after a mean follow-up time of 6 years, 34% of patients had progressive kidney disease [8]. We noted a statistically significant difference between smoking at T0 and the change in ND ($p = 0.023$). Several prospective studies have suggested that tobacco use increases the relative risk of deterioration in kidney function (2 to 2.5 times greater in smokers compared to non-smokers) [12].

In the RENAAL study, in 272 smokers and 1241 non-smokers with type 2 diabetes with ND, a ratio of 1.04 (95% CI) of doubling serum creatinine was demonstrated [13]. In our study, patients with an unfavorable course of their ND had a better glycemic balance during follow-up than those with a favorable course with a statistically significant difference ($p = 0.019$). The ACCORD study failed to find an impact of strict glycemic control on the progression of diabetic kidney disease

[14]. Similarly, in the study by ChingHeng *et al.*, no association between HbA1c level and kidney failure was demonstrated [15].

However, our results are not consistent with Bash *et al.* and Bouattar *et al.*, who found a positive association between HbA1c values and diabetic kidney disease progression in 1871 diabetic patients after 11 years of follow-up [16] [17]. These discrepancies could be explained by the fact that at the stage of severe CKD, the interpretation of HbA1c becomes difficult due to the existence of anemia, iron deficiency and the decrease in the lifespan of red blood cells [18]. In our study, baseline albuminuria and serum serum creatinine were independent predictors of diabetic nephropathy progression and mean nephropathy during follow-up. These results are consistent with several published international studies. In the post hoc analysis of the RENNAL study of 1513 patients with type 2 diabetes,

Baseline albuminuria was the strongest and most consistent independent risk factor during follow-up to reach the composite endpoint of doubling serum creatinine or developing end-stage CKD [13]. Yokoyama *et al.*, also confirmed in their study of 1002 Japanese patients with type 2 diabetes with relatively well-preserved kidney function who were followed for 4 years, that urinary albumin excretion was among the most important risk factors for the progression of albuminuria and the annual decline in GFR [19].

In our study, higher systolic blood pressure values as well as blood pressure balance were significantly associated with an unfavorable course of ND, at the time of diagnosis and during follow-up. In the literature, all interventional studies have clearly established that optimal blood pressure control is capable of reducing the rate of progression kidney damage and failure [20].

The study by Altemtam *et al.*, showed that all BP parameters were found to be positively correlated with the annual reduction in GFR. In multivariate regression analysis, baseline SBP was independently associated with that of GFR decline (8). Rossing *et al.*, reported that baseline SBP was one of the main predictors of lower GFR in the analysis of 227 Caucasian patients with diabetic kidney disease [9]. Similarly, in the study by Zoppini *et al.*, hypertension was strongly associated with a faster annual decline in GFR [21]. In the MDRD study, it was also shown that lowering BP below target values was beneficial in patients with in diabetic patients.

4. Conclusions

Diabetic nephropathy is one of the severe complications of poorly managed diabetes. In the General Medicine department of the prefectural hospital of Siguiri, the prevalence of diabetic nephropathy is about 8.75%; the male gender was the most represented (62.86% of cases). It is a condition that affects men with an average age of 58.7 years. Type 2 diabetes is the most common, accounting for 90.7% of cases. Poorly controlled risk factors could lead diabetic nephropathy to a deterioration of kidney function, particularly hypertension (70.8%), glycemic imbalance (66.7%), and proteinuria (62.5%).

The authors declare that they have no conflict of interest directly related to the

content of this article.

Conflicts of Interest

The authors declare no conflicts of interest.

References

[1] Held, P.J., Port, F.K., Blagg, C.R. and Agodoa, L.Y. (1990) The United States Renal Data System's 1990 Annual Data Report: an introduction. *American Journal of Kidney Diseases*, **16**, i-ii, 1-106.

[2] Tuttle, K.R., Bakris, G.L., Bilous, R.W., Chiang, J.L., de Boer, I.H., Goldstein-Fuchs, J., *et al.* (2014) Diabetic Kidney Disease: A Report from an ADA Consensus Conference. *American Journal of Kidney Diseases*, **64**, 510-533. https://doi.org/10.1053/j.ajkd.2014.08.001

[3] Davies, M.J., D'Alessio, D.A., Fradkin, J., Kernan, W.N., Mathieu, C., Mingrone, G., *et al.* (2018) Management of Hyperglycemia in Type 2 Diabetes, 2018. a Consensus Report by the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD). *Diabetes Care*, **41**, 2669-2701. https://doi.org/10.2337/dci18-0033

[4] Williams, B., Mancia, G., Spiering, W., Agabiti Rosei, E., Azizi, M., Burnier, M., *et al.* (2018) 2018 ESC/ESH Guidelines for the Management of Arterial Hypertension. *European Heart Journal*, **39**, 3021-3104. https://doi.org/10.1093/eurheartj/ehy339

[5] Catapano, A.L., Graham, I., De Backer, G., Wiklund, O., Chapman, M.J., Drexel, H., *et al.* (2016) 2016 ESC/EAS Guidelines for the Management of Dyslipidaemias. *European Heart Journal*, **37**, 2999-3058. https://doi.org/10.1093/eurheartj/ehw272

[6] Zhu, Y., Pandya, B.J. and Choi, H.K. (2011) Prevalence of Gout and Hyperuricemia in the US General Population: The National Health and Nutrition Examination Survey 2007-2008: Prevalence of Gout and Hyperuricemia in the US. *Arthritis & Rheumatism*, **63**, 3136-3141. https://doi.org/10.1002/art.30520

[7] Domenica Cappellini, M. and Motta, I. (2015) Anemia in Clinical Practice—Definition and Classification: Does Hemoglobin Change with Aging? *Seminars in Hematology*, **52**, 261-269. https://doi.org/10.1053/j.seminhematol.2015.07.006

[8] Altemtam, N., Russell, J. and El Nahas, M. (2011) A Study of the Natural History of Diabetic Kidney Disease (DKD). *Nephrology Dialysis Transplantation*, **27**, 1847-1854. https://doi.org/10.1093/ndt/gfr561

[9] Rossing, K., Christensen, P.K., Hovind, P., Tarnow, L., Rossing, P. and Parving, H. (2004) Progression of Nephropathy in Type 2 Diabetic Patients. *Kidney International*, **66**, 1596-1605. https://doi.org/10.1111/j.1523-1755.2004.00925.x

[10] Bouenizabila, E., Loumingou, R., Motoula, M., Andzouana, N. and Monabeka, H. (2015) La néphropathie diabétique au CHU de Brazzaville, Congo: Aspects épidémiologiques, cliniques, et facteurs de risque. *Médecine des Maladies Métaboliques*, **9**, 220-226. https://doi.org/10.1016/s1957-2557(15)30048-1

[11] Lipscombe, L.L. and Hux, J.E. (2007) Trends in Diabetes Prevalence, Incidence, and Mortality in Ontario, Canada 1995-2005: A Population-Based Study. *The Lancet*, **369**, 750-756. https://doi.org/10.1016/s0140-6736(07)60361-4

[12] Yokoyama, H., Tomonaga, O., Hirayama, M., Ishii, A., Takeda, M., Babazono, T., *et al.* (1997) Predictors of the Progression of Diabetic Nephropathy and the Beneficial Effect of Angiotensin-Converting Enzyme Inhibitors in NIDDM Patients. *Diabetologia*,

40, 405-411. https://doi.org/10.1007/s001250050694

[13] Keane, W.F., Brenner, B.M., de Zeeuw, D., Grunfeld, J., McGill, J., Mitch, W.E., *et al.* (2003) The Risk of Developing End-Stage Renal Disease in Patients with Type 2 Diabetes and Nephropathy: The RENAAL Study. *Kidney International*, **63**, 1499-1507. https://doi.org/10.1046/j.1523-1755.2003.00885.x

[14] Gerstein, H.C., Miller, M.E., Byington, R.P., *et al.* (2008) Effects of Intensive Glucose Lowering in Type 2 Diabetes. *The New England Journal of Medicine*, **358**, 2545-2559.

[15] Lin, C.H., Yang, W.C., Tsai, S.T., Tung, T.H. and Chou, P. (2007) A Community-Based Study of Chronic Kidney Disease among Type 2 Diabetics in Kinmen, Taiwan Region. *Diabetes Research and Clinical Practice*, **75**, 306-312. https://doi.org/10.1016/j.diabres.2006.06.028

[16] Bash, L.D., Selvin, E., Steffes, M., Coresh, J. and Astor, B.C. (2008) Poor Glycemic Control in Diabetes and the Risk of Incident Chronic Kidney Disease Even in the Absence of Albuminuria and Retinopathy: Atherosclerosis Risk in Communities (ARIC) Study. *Archives of Internal Medicine*, **168**, 2440-2447. https://doi.org/10.1001/archinte.168.22.2440

[17] Bouattar, T., Ahid, S., Benasila, S., Mattous, M., Rhou, H., Ouzeddoun, N., *et al.* (2009) Les facteurs de progression de la néphropathie diabétique: Prise en charge et évolution. *Néphrologie & Thérapeutique*, **5**, 181-187. https://doi.org/10.1016/j.nephro.2008.12.004

[18] Saudek, C.D., Derr, R.L. and Kalyani, R.R. (2006) Assessing Glycemia in Diabetes Using Self-Monitoring Blood Glucose and Hemoglobin A1c. *JAMA*, **295**, 1688-1697. https://doi.org/10.1001/jama.295.14.1688

[19] Yokoyama, H., Kanno, S., Takahashi, S., Yamada, D., Honjo, J., Saito, K., *et al.* (2011) Risks for Glomerular Filtration Rate Decline in Association with Progression of Albuminuria in Type 2 Diabetes. *Nephrology Dialysis Transplantation*, **26**, 2924-2930. https://doi.org/10.1093/ndt/gfq774

[20] Monnier, L. (2014) Néphropathie diabétique. In: Monnier, L., Ed., *Diabétologie*, Elsevier, 229-250. https://linkinghub.elsevier.com/retrieve/pii/B9782294739545000111

[21] Zoppini, G., Targher, G., Chonchol, M., Ortalda, V., Negri, C., Stoico, V., *et al.* (2012) Predictors of Estimated GFR Decline in Patients with Type 2 Diabetes and Preserved Kidney Function. *Clinical Journal of the American Society of Nephrology*, **7**, 401-408. https://doi.org/10.2215/cjn.07650711