

# Factors Associated with Diabetic Nephropathy in the Endocrinology Department of the Libreville University Hospital in 2023

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**How to cite this paper:** Ziza Ngaila, N.P., Nsame, D., Mfoumou, A., Pambo Moumba, T.Y., Ndong, L.C.B., Bilogue, P.F., Ibounde, E.T., Gorra, A., Baye, E. and Ndouongo, P.K. (2025) Factors Associated with Diabetic Nephropathy in the Endocrinology Department of the Libreville University Hospital in 2023. *Open Journal of Endocrine and Metabolic Diseases*, 15, 101-110.  
<https://doi.org/10.4236/ojemd.2025.157010>

**Received:** June 3, 2025

**Accepted:** July 12, 2025

**Published:** July 15, 2025

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## Abstract

**Introduction:** Diabetic nephropathy (DN) is a serious complication of diabetes, due to its potential progression to end-stage renal disease (ESRD), of which it is the main cause. The aim of this study was to identify the main risk factors associated with DN. **Methodology:** Analytical cross-sectional study conducted between January 2022 and November 2024, including diabetic patients who consulted the CHUL endocrinology department and showed albuminuria or proteinuria, divided into two groups: those with DN and those without. The 2 groups were compared. **Results:** A total of 99 patients were included, predominantly women (sex ratio: 0.98). The mean age of the population was  $59 \pm 11$  years, with extremes ranging from 29 to 78 years. DN was present in 45.45% of cases. In the DN group, the average age was  $60 \pm 11$  years, and 52.38% had diabetes for more than 10 years, compared with 24.56% of controls. Arterial hypertension (AH) accounted for 69.05% in the DN group, versus 64.91% in controls. HbA1c above 7.5% accounted for 38.09% in the DN group, versus 56.14%. For chronic kidney disease (CKD), stage 3a accounted for 16.67% of patients in the DN group, versus 10.91%, and stage 3b for 7.14% versus 5.45%. No stage 5 DN was found in the control group. Factors significantly associated with DN were age ( $p = 0.01$ ), family history ( $p < 0.0001$ ), duration of diabetes ( $p = 0.01$ ), nephrology follow-up ( $p < 0.0001$ ), hypertension ( $p = 0.047$ ) and HbA1c ( $p = 0.006$ ). Age over 65 years increased the risk of ND (OR = 2.28), and duration of diabetes over 10 years increased the risk (OR = 5.34). High blood pressure increased the risk of DN (OR = 1.21). **Discussion:** All in all, age and duration of diabetes are determinants of diabetic

nephropathy, but cannot be controlled. On the other hand, glycemic control, blood pressure management and early nephrology follow-up represent major areas of intervention to prevent or slow the progression of this complication.

## Keywords

Nephropathy, Diabetes, Complications

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## 1. Introduction

Diabetic nephropathy is a chronic kidney disease caused by diabetes, characterized by persistent albuminuria ( $>30$  mg/g creatinine or  $>30$  mg/24h), progressive reduction in glomerular filtration rate (GFR) ( $<60$  mL/min/1.73m<sup>2</sup>), in the absence of other causes of kidney disease [1]. It affects up to 40% of people with diabetes and can result in chronic kidney disease (CKD), cardiovascular disease (CVD) and premature death. DN is one of the leading causes of chronic kidney disease (CKD) and end-stage renal disease (ESRD) worldwide [2].

According to the WHO, by 2021, diabetes and diabetic nephropathy will have caused over two million deaths, making diabetes the leading cause of end-stage renal failure in Europe, comparable to hypertension (12% - 30%) [3]. In the United States, it accounts for over half of all dialysis cases [4]. The early stages of the disease are asymptomatic; early diagnosis enables more effective, multidisciplinary management and delays progression to chronic renal failure. Diabetic nephropathy has become the leading cause of dialysis admissions in Europe, and with each successive stage of nephropathy (glomerular hyperfiltration, micro-albuminuria, macro-albuminuria, renal failure) comes an even higher risk of cardiovascular events [4]. Early diagnosis allows for timely intervention, effective management strategies can slow disease progression and reduce complications, and research efforts continue to drive innovation in treatment approaches. Collaboration between healthcare professionals, researchers, and people with diabetes is essential to combat diabetic kidney disease and improve the lives of those affected by the disease [5].

In Gabon, few data are available on diabetes-related renal impairment. This study was designed to examine diabetic nephropathy. The aim of this study was to describe the characteristics of diabetic nephropathy and to identify the factors associated with this pathology in a group of diabetic patients followed at the Endocrinology and Metabolic Diseases Department of the University Hospital of Libreville.

## 2. Methodology

This was a descriptive and analytical cross-sectional study conducted from January 2022 to November 2024 in the outpatient pool of the CHUL Endocrinology Department. Included were diabetic patients who consulted the department be-

tween January 1, 2022 and November 30, 2024 and who had 24-hour microalbuminuria and/or proteinuria. These two groups were compared. Recruitment was systematic and exhaustive. Sociodemographic, clinical, paraclinical and therapeutic data were collected. Data for all aspects of our study were collected using a questionnaire written in French, designed specifically for the research. This questionnaire was then integrated into the Kobo Collect mobile application, the tool used for field data collection. The data were then analyzed using STATA 11 software. The dependent variable was positive microalbuminuria defined as excretion of 30 to 299 mg of albumin in 24-hour urine or 24-hour proteinuria greater than 3 g. To be able to identify factors associated with the occurrence of albuminuria in our study, the group of diabetics with positive micro or macroalbuminuria was compared with the group of diabetics without positive albuminuria. The independent variables were: age (expressed in years), sex, family history of diabetes, personal history of hypertension, smoking, length of diabetes: calculated in years from the time diabetes was diagnosed, diabetes was considered unbalanced if glycated hemoglobin (HbA1c) > 7%, Body Mass Index (BMI) = calculated using the formula (Weight/Height<sup>2</sup>), obesity was defined for a BMI > 30 kg/m<sup>2</sup>, creatinine clearance: calculated using the cKd epi formula considered impaired if below 60 mL/min. Stage 1: ≥90 mL/min, Stage 2: 60 - 89 mL/min, Stage 3a: 45 - 59 mL/min, Stage 3b: 30 - 44 mL/min, Stage 4: 15 - 29 mL/min, Stage 5: <15 mL/min. Treatment was either oral antidiabetics plus insulin or mixed treatment combining oral antidiabetics and insulin.

Data analysis was performed in two stages: a descriptive stage and an analytical stage. Quantitative descriptive variables were expressed as mean with standard deviation. Qualitative variables were described by percentage proportions. The exploratory study of factors associated with diabetic nephropathy was structured as a bivariate and multivariate analysis. In the multivariate analysis, a top-down stepwise logistic regression was used to identify the variables associated with DN. Adjusted Odds Ratios (OR) with their 95% confidence intervals were generated to quantify the strength of associations. The difference in comparisons was considered significant for values of  $p < 0.05$ . Informed consent was obtained from patients prior to their inclusion in the study. The identity and information collected were kept confidential.

### 3. Results

#### 3.1. Descriptive Study

A total of 99 patients with a mean age of  $59 \pm 11$  years, ranging from 29 to 78 years, were included. There were as many men as women, with a sex ratio of 0.98. Hypertension was found in 66.67% of patients, and a family history of diabetes in 37.37%. Smoking was uncommon (5.05%). The presumptive type of diabetes was predominantly type 2 (93.94%), and the average duration of diabetes was  $9 \pm 7$  years, with extremes ranging from 3 to 29 years. A duration of diabetes of more than 5 years was found in 58.58%, and 36.38% had diabetes for more than 10 years.

Obesity represented 40.40% of individuals, overweight 36.36%, and normal BMI 21.21%. Among the 99 diabetics in the sample, 37.37% had positive microalbuminuria and 8.08% macroproteinuria, with an overall incidence of nephropathy of 45.45%. The mean duration of diabetes in the nephropathy group was  $11 \pm 8$  years. Mean microalbuminuria was  $61.41 \text{ mg}/24 \text{ h} \pm 93.41$ , and mean proteinuria was  $519.25 \text{ mg}/24 \text{ h} \pm 312.14$ . Other biological parameters showed a mean HbA1c of  $7.92\% \pm 2.2$ , with 40.21% of patients having an HbA1c between 6 and 7.5%, 32.99% between 7.5 and 10%, and 14.43% above 10%. Regarding treatment, 60.00% of patients were on ADO, 14.12% on insulin therapy, and 25.88% on mixed therapy. **Table 1** summarizes patient characteristics.

**Table 1.** Patient characteristics.

Clinical characteristics	Number (N = 99)	Percentage (%)
<b>Sex</b>		
Male	49	49.49
Female	50	50.51
<b>Age range</b>		
Under 35	6	6.06
35 - 50 years	17	17.17
50 - 65 years	50	50.51
Over 65 years	26	26.26
<b>Family history</b>	37	37.37
<b>Smoking</b>	5	5.05
<b>Nephrology follow-up</b>	28	28.57
<b>Type of diabetes</b>		
DT1	6	6.06
DT2	93	93.94
<b>Duration of diabetes</b>		
Less than 5 years	41	41.41
5 - 10 years	22	22.22
Over 10 years	36	36.36
<b>HTN</b>	66	66.67
<b>Body Mass Index</b>		
Underweight	2	2.02
Normal weight	21	21.21
Overweight	36	36.36
Obesity	40	40.40
<b>Hba1c</b>		
Below 6%	12	12.37

**Continued**

6% - 7.5%	39	40.21
7.5% - 10%	32	32.99
Over 10%	14	14.43

**3.2. Analytical Study**

To determine the factors associated with diabetic nephropathy, we compared groups of patients with positive microalbuminuria or macroproteinuria with those without diabetic nephropathy. In univariate analysis, there was a significant association between diabetic nephropathy and duration of diabetes, family history of diabetes, arterial hypertension, HbA1c above 7%, and mixed treatment (ADO+ Insulin) (**Table 2**). Multivariate analysis with logistic regression simultaneously assessed the effect of several variables on the presence of diabetic nephropathy. Adjusted for other variables alone, a duration of diabetes of more than 10 years, family history of diabetes, HbA1c greater than 7%, and mixed treatment (ADO+ Insulin), nephrology follow-up was strongly associated with diabetic nephropathy, with a p-value less than 0.05.

(**Table 3**). Diabetes with a duration exceeding 10 years increases the risk of developing diabetic nephropathy (OR: 4.78), as does unbalanced diabetes with HbA1c greater than 7.5% (OR: 0.28) and mixed treatment (OR: 4.21). These results are summarized in **Table 3**.

**Table 2.** Distribution of patients according to the presence of diabetic nephropathy.

	Diabetic nephropathy		OR	95% CI OR	p-value
	Yes	No			
Age range					<b>0.36</b>
Under 35 years	2 (33.33)	4 (66.67)	0.71	0.10 - 5.03	
35 - 50 years	7 (41.18)	10 (58.82)	1	Ref.	
50 - 65 years	19 (38.78)	30 (61.22)	0.90	0.29 - 2.78	
Over 65 years	17 (68.00)	8 (32.00)	3.03	0.84 - 10.92	
Family history					<b>0.000</b>
Yes	17 (47.22)	19 (52.78)	1.05	0.46 - 2.40	
No	28 (45.90)	33 (54.10)	1	Ref.	
Nephrology follow-up					0.0000
Yes	25 (89.29)	3 (10.71)	21.49	5.80 - 79.6	
No	19 (27.94)	49 (72.06)	1	Ref.	
Duration of diabetes					<b>0.010</b>
Less than 5 years	17 (42.50)	26 (57.50)	1.74	0.57 - 5.34	
5 - 10	6 (27.27)	16 (72.73)	1	Ref.	
More than 10 years	22 (62.86)	13 (37.14)	4.51	1.41 - 14.42	

**Continued**

HTN					0.0224
Yes	31 (47.69)	34 (52.31)	1.17	0.50 - 2.74	
No	14 (43.75)	18 (56.25)	1	Ref.	
HbA1c					0.05
Below 6%	4 (33.33)	8 (66.67)	0.38	0.099 - 1.5	
6% - 7.5%	22 (56.41)	17 (43.59)	1	Ref.	
7.5% - 10%	8 (26.67)	22(73.33)	0.28	0.1 - 0.78	
Over 10%	9 (64.29)	5 (35.71)	1.39	0.39 - 4.91	
Anti-diabetes treatment					0.09
ADO	19 (38.78)	30 (61.22)	1	Ref.	
Mixed	16 (72.73)	6 (27.27)	4.21	1.40 - 12.65	
Insulin	4 (33.33)	8 (66.67)	0.78	0.20 - 2.79	

**Table 3.** Final model of factors associated with diabetic nephropathy multivariate analysis.

Associated factors	OR	95% CI OR	p-value
<b>Duration of diabetes</b>			<b>0.015</b>
Less than 5 years	1.74	0.57 - 5.34	
5 - 10 years	1	Ref.	
More than 10 years	4.51	1.41 - 14.42	
<b>HbA1c</b>			<b>0.02</b>
Below 6%	0.38	0.099 - 1.5	
6% - 7.5%	1	Ref.	
7.5% - 10%	0.28	0.1 - 0.78	
Over 10%	1.39	0.39 - 4.91	
<b>Anti-diabetes treatment</b>			<b>0.03</b>
ADO	1	Ref.	
MIXED	4.21	1.40 - 12.65	
INSULIN	0.78	0.20 - 2.79	

**4. Discussion**

The prevalence of diabetic nephropathy found in the present study was 45.45%, higher than that found by Ibrahim Hamat *et al.* in Chad (29.80%) [6] and by Y. Errahali *et al.* in Rabat (39.80%) [7] but close to that found by A. Kacem *et al.* in Tunisia (49%) [8]. This prevalence varies widely from one series to another and is constantly on the rise. Indeed, the IDF reported a 74% increase in type 2 diabetes-related chronic kidney disease worldwide between 1990 and 2017 [9]. It is the leading cause of kidney failure worldwide, and up to 40% of people with diabetes

develop CKD [10]. This complication is now recognized as a risk factor for cardiovascular events, increasing diabetes-related morbidity and mortality. According to the WHO, by 2021, diabetes and diabetic nephropathy will have caused over two million deaths [3]. Diabetic nephropathy has become the leading cause of dialysis admission in Europe, and with each successive stage of nephropathy (glomerular hyperfiltration, micro-albuminuria, macro-albuminuria, renal failure) comes an even higher risk of cardiovascular events. Not all diabetic patients are at risk of developing severe nephropathy, and a genetic predisposition has been identified and partially revealed in these details [4]. Other risk factors for the development of nephropathy include nephron endowment at birth, possibly impaired by an unfavorable fetal environment, arterial hypertension, smoking, certain lipid abnormalities, and of course hyperglycemia. The level of proteinuria is also a prognostic factor and a therapeutic objective [9].

Male predominance has been found in most studies [2] [11], and male sex has been identified as a risk factor for diabetic nephropathy [12]. Y. Errahali *et al.* and Bouattar *et al.* [7] [13], on the other hand, found a predominance of females, although in this study, there were as many males as females. The mean age of DN patients was  $60 \pm 11$  years; E. Bouenizabila *et al.* in Congo, S. Dziri *et al.* in Sousse and N Anoun *et al.* in Fes found mean ages close to this, respectively  $55.9 \pm 10.4$ ,  $57.81 \pm 14.64$  and  $56.2 \pm 14.8$  years [13] [14]. The age group most affected by diabetic nephropathy was between 50 years and over (80%), a result close to that of Ibrahim Hamat *et al.*, who found in their series that 87% of patients with diabetic nephropathy were between 50 years and over [6]. The mean duration of diabetes in patients with DN was  $11 \pm 8$  years, close to that found by Anoun *et al.* ( $10.9 \pm 8.2$  years) [15].

In our study, type 2 diabetes predominated in 93.33% of patients, a finding made by several authors [16] [17]. Epidemiologically, type 2 diabetes accounts for 90% of all diabetes, and diabetic nephropathy is more frequent in type 2 diabetes. However, 6.66% of patients presenting with nephropathy were type 1 diabetics. These results are like those found by Ould *et al.* in Dakar, who showed that nephropathy was present in 93.6% of type 2 diabetics and 6.4% of type 1 diabetics [18]. This low proportion of type 1 diabetics can be explained by the fact that diabetic nephropathy is correlated with the duration of diabetes, and in type 1 diabetes, it almost never occurs before 10 years of disease progression, and is rare before 15 years [19].

Arterial hypertension was found in 69% of patients with diabetic nephropathy, and was significantly associated with diabetic nephropathy; in fact, hypertension is an independent risk factor for the onset and progression of IR, as found by Charfi *et al.* in Tunisia [17], and Khadija Ben Naceur *et al.* found that higher systolic blood pressure values and blood pressure control were significantly associated with an unfavorable evolution of DN [20], at the time of diagnosis and during follow-up, the rate of deterioration of renal function in diabetic nephropathy depends closely on blood pressure and proteinuria. There is a close correlation be-

tween poor blood pressure control and the well-documented deterioration of renal function in diabetes, and controlling blood pressure and other risk factors can significantly slow the deterioration of GFR to around 2 - 3 mL/min/year [21]. All this suggests that good control of hypertension in our patients would reduce the risk of diabetic nephropathy, implying multidisciplinary and holistic management with emphasis on patient education and awareness of treatment compliance and blood pressure self-measurement. In the present study, the proportion of patients with DN with diabetic imbalance was 37%, a figure far lower than that found by Tarik Bouattar *et al.* in Morocco and E. Bouenizabila *et al.* in Congo, who found respectively 68.7% and 70.5% [11] [13], although in our study, we note that most patients with diabetic nephropathy have satisfactory glycemic control. HbA1c control plays a key role in the management of diabetic nephropathy. The impact of glycemic control on the development and progression of DN has been demonstrated [22], so control of this parameter would considerably reduce the progression of the disease towards a terminal stage. Our study showed that among patients with diabetic nephropathy, only 1 had CKD. This result is at odds with most of the results found in the literature, Ibrahim Hamat *et al.* in Chad (29.6%) [6] E. Bouenizabila in Congo (44.9%) [11]. Our study also showed that 31% of patients had renal disease with normal GFR. These results can be explained by early detection of diabetic nephropathy and early nephrology follow-up, since more than half of the patients with nephropathy were already under nephrology care (55.55%), with early initiation of nephroprotective measures.

In multivariate analysis, the factors associated with diabetic nephropathy found were the length of time patients had diabetes, and the prolonged duration of diabetes ( $\geq 10$  years) was associated with an increased risk of developing diabetic nephropathy, with a p-value of 0.015. This indicates that diabetic patients with a longer duration of diabetes have a higher risk of developing this complication.

An HbA1c between 7.5% and 10% is associated with a significantly increased risk of diabetic nephropathy (OR = 1.39), with a p-value of 0.02. Combined treatment (ADO and insulin) is also significantly associated with diabetic nephropathy, with a p-value of 0.03. This result suggests that patients receiving combined treatment may be at increased risk of developing diabetic nephropathy. Y. Errahali *et al.* in Rabat found age, long-standing diabetes and high blood pressure to be factors associated with DN [7] and Kacem *et al.* DN is associated with poor glycemic control ( $p = 0.02$ ), while high blood pressure appeared to be a factor in the onset and worsening of DN [8]. Nephrology follow-up was strongly associated with diabetic nephropathy, with a p-value of less than 0.05. This result suggests that specialized nephrology management is essential to prevent or delay the onset of diabetic nephropathy, which is in line with current clinical recommendations.

Our work has certain limitations: cross-sectional data collection during diabetes follow-up consultations and small sample size. On the other hand, and despite these limitations, our study has the advantage of being a preliminary Gabonese study that looked at factors associated with DN.

## 5. Conclusion

At the end of this study, diabetic nephropathy in the endocrinology department of the University Hospital of Libreville is a reality. We found a fairly moderate prevalence and associated factors such as duration of diabetes of more than 10 years, family history of diabetes, HbA1c above 7%. Prevention and information measures need to be stepped up for all diabetic patients. Multidisciplinary management of these patients is recommended, as is systematic screening for ND, as it often develops gradually, and early detection enables interventions to be implemented to slow or even halt its progression, thereby reducing the risk of complications associated with diabetic nephropathy and improving patients' quality of life.

## Acknowledgements

The authors would like to thank the CHUL authorities for granting permission to carry out the study.

## Authors' Contributions

All authors participated in the manuscript. They have read and approved the final version.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

## References

- [1] Standards of Care in Diabetes (2024) Chronic Kidney Disease and Risk Management. *Diabetes Care*, **47**, S219-S230. <https://doi.org/10.2337/dc24-S01>
- [2] Thervet, E. (2022) Néphropathie diabétique. *Néphrologie*. [http://www.sciencedirect.com/science/article/pii/S1762-0945\(22\)86770-X](http://www.sciencedirect.com/science/article/pii/S1762-0945(22)86770-X)
- [3] Organisation Mondiale de Santé OMS. Diabète. <https://www.who.int/fr/news-room/fact-sheets/detail/diabetes>
- [4] Roussel, R. (2011) Histoire naturelle de la néphropathie diabétique. *Médecine des Maladies Métaboliques*, **5**, S8-S13. [https://doi.org/10.1016/s1957-2557\(11\)70053-0](https://doi.org/10.1016/s1957-2557(11)70053-0)
- [5] Wandile, P.M. (2023) Diabetic Nephropathy and Management. *Open Journal of Nephrology*, **13**, 317-327.
- [6] Hamat, I., Abderraman, G.M., Cisse, M.M., Youssouf, M., Djafar, M.S., Mbaingui-nam, D., *et al.* (2016) Profil de la néphropathie diabétique à l'Hôpital Général de Référence Nationale de N'Djamena (Tchad). *Pan African Medical Journal*, **24**, Article No. 193. <https://doi.org/10.11604/pamj.2016.24.193.8415>
- [7] Errahali, Y., Moumen, A., Chakdoufi, S., Guerboub, A.A., El Jadi, H., Meftah, A., *et al.* (2015) Facteurs associés à la néphropathie diabétique: À propos de 230 cas. *Annales d'Endocrinologie*, **76**, Article No. 552. <https://doi.org/10.1016/j.ando.2015.07.853>
- [8] Kacem, A., Ben Ahmed, I., Berriche, O., Jamoussi, H., Ben Ammar, I., Mnif, S., *et al.* (2008) P194 Prévalence et facteurs prédictifs de la néphropathie diabétique chez le diabétique type 2. *Diabetes & Metabolism*, **34**, H94.

- [https://doi.org/10.1016/s1262-3636\(08\)73106-9](https://doi.org/10.1016/s1262-3636(08)73106-9)
- [9] Fédération Internationale du Diabète FID. Diabète et maladies rénales. Atlas du Diabète et registre iCaReMe. <https://idf.org/fr/events/webinars/diabetes-and-kidney-disease/>
- [10] Maison, Ressources, diabète V avec le, Reconnaissance, Faq, Contact, et al. Diabète et maladie rénale|Atlas du diabète de la FID. <https://diabetesatlas.org/atlas/diabetes-and-kidney-disease/>
- [11] 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](https://doi.org/10.1016/s1957-2557(15)30048-1)
- [12] McFarlane, P., Gilbert, R.E., MacCallum, L. and Senior, P. (2013) La néphropathie chronique en présence de diabète. *Canadian Journal of Diabetes*, **37**, S504-S512. <https://doi.org/10.1016/j.cjcd.2013.07.026>
- [13] 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>
- [14] Dziri, S., Aicha, N.B., Azzabi, A., Sahtout, W., Mrabet, S., Fradi, A., et al. (2022) Profil de la néphropathie diabétique au moment de diagnostic: Sévérité et retentissement sur la fonction rénale (à propos de 548 patients). *Néphrologie & Thérapeutique*, **18**, 413-414. <https://doi.org/10.1016/j.nephro.2022.07.371>
- [15] Anoun, N., Belmahi, N., El Ouahabi, H. and Ajdi, F. (2016) Les déterminants de la progression de la maladie rénale diabétique. *Annales d'Endocrinologie*, **77**, Article No. 508. <https://doi.org/10.1016/j.ando.2016.07.778>
- [16] Khélifi, N., Khadhraoui, E., Trabelsi, N., Falfoul, A., Ben Mami, F., Dakhli, S., et al. (2011) P232—La néphropathie diabétique: Profils clinique et épidémiologique. *Diabetes & Metabolism*, **37**, A88. [https://doi.org/10.1016/s1262-3636\(11\)70858-8](https://doi.org/10.1016/s1262-3636(11)70858-8)
- [17] Charfi, N., Kallel, N., Grine, S., Mnif Feki, M. and Abid, M. (2010) P67 Aspects cliniques et évolutifs de la néphropathie diabétique à propos de 60 cas. *Diabetes & Metabolism*, **36**, A55. [https://doi.org/10.1016/s1262-3636\(10\)70215-9](https://doi.org/10.1016/s1262-3636(10)70215-9)
- [18] Ould Isselmou, E.B., Abdoul, N., Abdoulaye, L., Abdoulaye, P., Mourtalla, K., Bou-bacar, D., et al. (2010) P35 Aspect épidémiologique, et diagnostique de la néphropathies chez le diabétique: étude rétrospective. *Diabetes & Metabolism*, **36**, A48. [https://doi.org/10.1016/s1262-3636\(10\)70183-x](https://doi.org/10.1016/s1262-3636(10)70183-x)
- [19] Société Française d'Endocrinologie SFE (2022) Complications dégénératives et métaboliques du diabète. <https://www.sfendocrino.org/complications-degeneratives-et-metaboliques-du-diabete/>
- [20] Ben Naceur, K., Abdesselem, H., Zribi, S., Sebai, I., Ounaissa, K. and Amrouche, C. (2021) Nephropathy in Type 2 Diabetics: Predictive Factors and Evolving Aspects. *La Tunisie Médicale*, **99**, 466-474.
- [21] Bakris, G.L., Williams, M., Dworkin, L., Elliott, W.J., Epstein, M., Toto, R., et al. (2000) Preserving Renal Function in Adults with Hypertension and Diabetes: A Consensus Approach. *American Journal of Kidney Diseases*, **36**, 646-661. <https://doi.org/10.1053/ajkd.2000.16225>
- [22] Gariani, K., De Seigneux, S. and Pechere-Bertschi, A. (2012) Néphropathie diabétique. *Revue Médicale Suisse*, **8**, 473-479. <https://doi.org/10.53738/revmed.2012.8.330.0473>