

Epidemiological Features of Diabetic Retinopathy in Abidjan (Côte d'Ivoire): A Study about 448 Patients

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Abstract

Introduction: Diabetic retinopathy is the retinal location of diabetic microangiopathy. It is a public health problem and one of the target diseases of the global Vision 2020 initiative. The aim of our study was to determine the epidemiological features and risk factors of diabetic retinopathy in the melanoderma African in Abidjan. **Materials and Methods:** We carried out a prospective observational study which took place from April to September 2016 and which focused on the diabetic subjects received in consultation in the Ophthalmology Department of Cocody University Hospital. All Patients had had bio-microscopic examination of the fundus with Goldman three-mirror contact lens and optic coherence tomography of the macula and, in some cases, retinal fluorescein angiography. **Results:** Out of a population of 448 patients, 200 had diabetic retinopathy. That is a prevalence of 45%. The prevalence of macular edema was 6%. The subpopulation of subjects with retinopathy consisted of 61.5% (123) of male patients versus 38.5% (77) of female patients. The mean age of female patients with retinopathy was 42 ± 14.08 years and that of male patients 58 ± 15.07 years. The majority of patients with retinopathy lived in urban areas (73%), and had type II diabetes. The duration of evolution of diabetes was 5 to 10 years in 65% of cases. Obesity, smoking, dyslipidemia and high blood pressure were the main factors of co-morbidity associated with poor glycemic control. **Discussion:** Diabetic retinopathy had a high prevalence and predominated in males. Maculopathy was represented by macular edema, which is the leading cause of diabetes-related blindness. **Conclusion:** The prevention of blindness related to diabetes requires regular multidisciplinary follow-up in order to treat retinal damage early.

Keywords

Diabetes, Fundus, Retinopathy, Maculopathy, Optic Coherence Tomography

1. Introduction

Diabetic retinopathy is the retinal location of diabetic microangiopathy. It is a public health problem and one of the target diseases of the global “Vision 2020” initiative. Diabetic macular edema is the leading cause of diabetes-related blindness and the leading cause of blindness before the age of 60 in industrialized countries [1] [2]. Changes in the lifestyle of populations in developing countries, and more particularly in African countries, raise fears of an increase in ocular complications of diabetes. The aim of our study was to determine the epidemiological features and risk factors of diabetic retinopathy in melanoderma African in Abidjan in sight to propose preventive measures and strengthen advocacy for the acquisition of curative treatment resources.

2. Materials and Methods

We carried out in the Ophthalmology Department of Cocody University Hospital, a prospective observational study that took place from April to September 2016. We included all diabetic patients (Type 1 or Type 2) received in Ophthalmology consultation during the study period. Each patient had had an ophthalmologic examination with a fundus examination with Goldmann three-mirror contact lens after dilatation. An optical coherence tomography of the macula was performed systematically in all patients in search of macular edema. The classification of ALFEDIAM [3] was used for diabetic retinopathy staging. Gestational diabetes subjects and patients who did not have macular OCT were included in the study in addition to the fundus examination. The duration of diabetes, the glycemic balance and the co-morbidity factors of diabetes in the occurrence of diabetic retinopathy have been studied. Data collection was done on a specific survey form.

The statistical analysis of the data was carried out using the Epi-Info version 3.5.3 software.

3. Results

3.1. Prevalence of Diabetic Retinopathy

Out of a population of 448 diabetic subjects included in the study, 200 of them had diabetic retinopathy that is a prevalence of 45% (**Figure 1**). The prevalence of non proliferative diabetic retinopathy was 30.13% versus 14.51% of proliferative retinopathy in the diabetic population.

Diabetic retinopathy was observed in 11.27% of cases in type I diabetics and in 88.72% of cases in type II diabetics.

3.2. Prevalence of Different Stages of Diabetic Retinopathy (Table 1)

We found 67.5% (135 patients) of non-proliferative diabetic retinopathy and 32.5% (65 patients) of proliferative diabetic retinopathy among the patients with diabetic retinopathy.

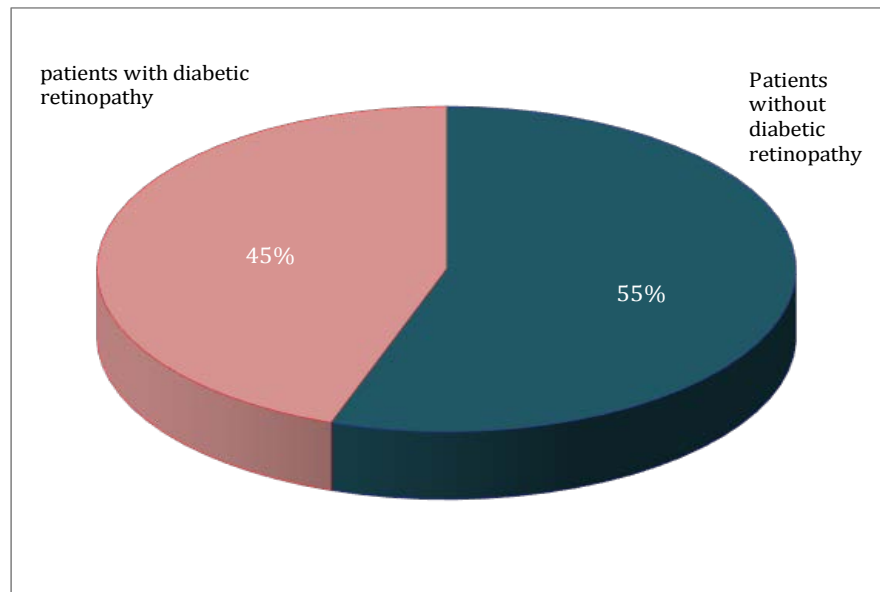


Figure 1. Prevalence of diabetic retinopathy.

Table 1. Prevalence of diabetic retinopathy and maculopathy.

Evolutionary stages	Frequencies	Percentages
NPDR	135	67.5
Minimal	53	26.5
Moderate	54	27
Severe	28	14
PDR	65	32.5
incipient	26	13
Moderate	22	11
Severe	11	5.5
Complicated	06	03

NPDR: Non-proliferative diabetic retinopathy. **PDR:** Proliferative diabetic retinopathy.

3.3. Diabetic Maculopathy

We did not observe macular ischemia but the prevalence of diabetic macular edema was 5.5% of the subjects (11 patients) with diabetic retinopathy. Seven patients (3.5%) were type I diabetics and four (2%) type II diabetics.

All patients with diabetic macular edema had severe or complicated proliferative diabetic retinopathy.

Macular edema involved 15 eyes of 11 patients and was bilateral in four of them that is 36.36% of patients with macular edema.

3.4. Sociodemographic Features of Patients with Diabetic Retinopathy

3.4.1. Distribution of Patients by Gender and Age (Table 2)

The distribution of patients with diabetic retinopathy by gender showed a clear male predominance. Indeed we observed 61.5% (123) of males versus 38.5% (77) of females. That is a sex ratio of 1.59 in favor of men.

Table 2. Distribution of patients by age and sex.

Age (years)	Gender	Number	Percentages
20 - 30	M*	04	2
	F*	03	1.5
30 - 40	M	13	6.5
	F	11	5.5
40 - 50	M	49	24.5
	F	44	22
50 - 60	M	37	18.5
	F	12	6
>60	M	20	10
	F	07	3.5

M: male; F: female; the mean age of women was 42 years \pm 14.08 (38 - 70 years) and that of men 58 years \pm 15.07 (31 - 65 years).

3.4.2. Area of Usual Residence of Patients (Figure 2)

73% of patients lived in urban areas.

3.4.3. Level of Education of Patients (Figure 3)

We found that 48% of patients with diabetic retinopathy had a university level of education.

3.5. Type of Diabetes and Glycemic Balance

The population of patients with diabetic retinopathy was composed of 78% of subjects (n = 156) with type II diabetes and 22% of subjects (n = 44) with type I diabetes.

Patients' mean fasting glucose level was 1.73 ± 0.83 g/l with extremes ranging from 0.71 to 3.76. Glycated hemoglobin was greater than 6% in 44.5% (89) of patients and less than 6% in 34.5% (21) of patients. In 21% (42) of them, the test was not carried out during the study period for financial reasons.

3.6. Age of Diabetes

Diabetes was known for less than 5 years in 7% (n = 14) of patients; it had an age ranging between 5 and 10 years in 65% of cases (n = 130) and greater than 10 years in 28% (n = 56) of cases.

3.7. Co-Morbidity Factors

Obesity was the most frequently identified risk factor (56.5%) in patients with diabetic retinopathy. The average body mass index of obese patients was 33.4 ± 2.1 kg/m².

In hypertensive patients (43%), the mean systolic pressure was 164.5 ± 39.8 mmHg and the mean diastolic pressure was 90.2 ± 19.4 mmHg.

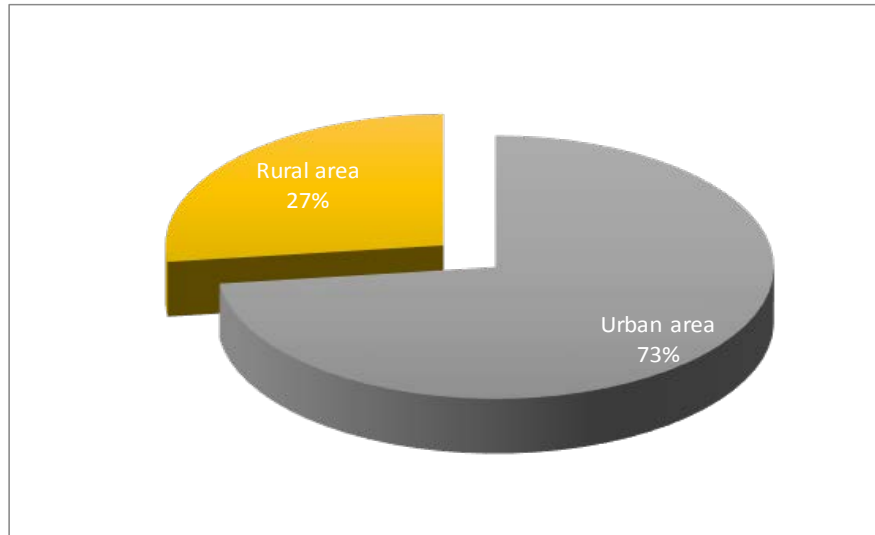


Figure 2. Usual residence of patients.

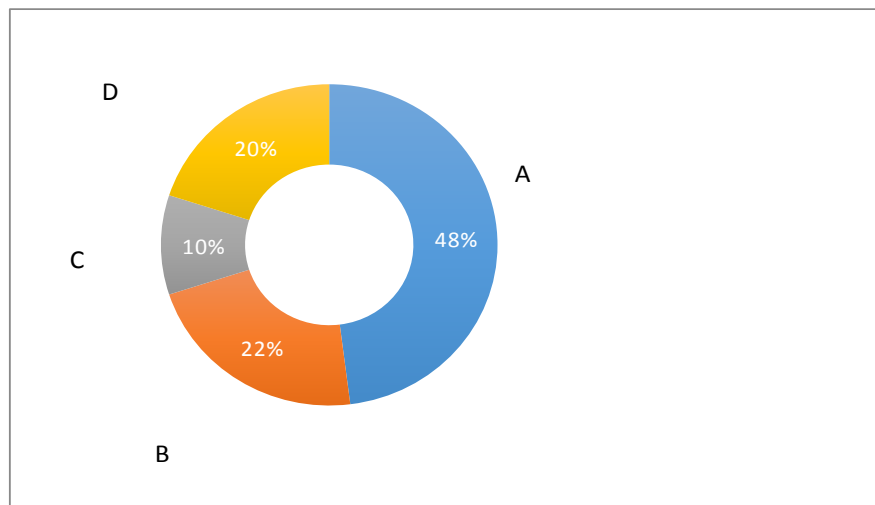


Figure 3. Patients' education level. A: University level; B: Secondary level; C: Primary level; D: Illiterate.

The mean proteinuria of patients with nephropathy (11%) was 2.5 ± 0.70 g/l and serum creatinine was 66 ± 26.1 mg/l.

3.8. Pace of Medical Follow-Up

The majority of patients (44%) had an annual follow-up with the diabetologist whereas the pace of ophthalmology consultations was greater than 1 year in 53% of them.

In addition, the notion of weekly home fasting blood glucose monitoring using a blood glucose meter was found in 16.5% (n = 33) of patients.

3.9. Therapeutic Management

The minimal and moderate stages of NPDR have benefited from a balancing of

blood glucose and other co-morbidities. Severe NPDR and early, moderate, severe, and even complicated PDRs have benefited from argon laser pan-retinal photocoagulation in addition to the previous measures. The proper treatment of TRDs has suffered from the lack of a technical platform for vitreoretinal surgery in our context.

4. Discussion

Diabetic retinopathy is the main ophthalmological complication of the diabetic patient and is the leading cause of blindness in people under 60 in industrialized countries [1] [2]. Its prevalence can be estimated through population-based epidemiological studies, ophthalmologist reporting studies, or screening campaigns. The corollary is the variability of the results according to the populations studied, the regions, and the methodology [4] [5]. The number of patients with diabetic retinopathy worldwide was estimated at 93 million in 2012, including 17 million patients with a proliferative form and 21 million with macular edema [6]. A meta-analysis of 35 population-based studies reported a prevalence of diabetic retinopathy, proliferative diabetic retinopathy, and diabetic Maculopathy of 34.6%, 7.0%, and 6.8%, respectively [7]. These prevalences are lower than those we observed, which were 45% for diabetic retinopathy and 14.6% for the proliferative form (**Figure 1, Table 1**), with however a prevalence less important of diabetic Maculopathy in our study 5.5%. The prevalence of diabetic retinopathy that we found, however, is close to that reported by Maroufizadeh [8] who noted in Iran a prevalence of 41.9% with 32.2% of non-proliferative retinopathy and 13.2% of proliferative retinopathy.

Edematous diabetic Maculopathy is the leading cause of blindness in people under 60 in industrialized countries [1] [2] [9]. The prevalence of this serious complication of diabetes also varies according to the studies, regions, and race. In fact, it is around 3% among Caucasian diabetics in the United States, Europe and Australia, while among Afro-Americans it varies between 8% and 11%. That is a frequency of 2.5 to 4 times higher than in white persons [6] [10] [11]. In diabetics of Latin American origin, the prevalence of macular edema ranges between 5% and 10% [10] [11]. In this study, diabetic macular edema was more common in type I diabetics, as previously reported by Yau [6]. It is important to educate diabetic patients to reduce the prevalence of diabetic retinopathy and maculopathy in our country.

Diabetic retinopathy was more common in males and was predominant in the 40 to 50 age group in both genders (**Table 2**), joining thus the results of Chatziralli [12]. The high prevalence of diabetic retinopathy in this age group contrasts with the work of Kusnik-Joinville who found a higher prevalence beyond 65 years in France [13]. Our results could be explained by a poor management of diabetes or by its earlier onset. Routine Diabetes Screening could help identify its actual prevalence by age in our context.

This type of diabetes is a risk factor for diabetic retinopathy and Maculopathy.

In this study, the high prevalence of type II diabetics in patients with retinopathy could be explained by a system of recruitment related to the greater representation of this subpopulation in our sample. These retinal complications of diabetes are more common in type I diabetics [6] [13] [14].

Whatever the type of diabetes, the glycemic balance and duration of the evolution of the disease are important factors in the incidence of diabetic retinopathy. An average blood glucose level of 1.73 +/- 0.83 g/l and a glycosylated hemoglobin level greater than 6% in 44.5% of patients showed poor glycemic control in many patients with diabetic retinopathy in our study. The duration and severity of fasting hyperglycemia as well as high glycosylated hemoglobin (greater than 6%) are major factors in the occurrence and progression of diabetic retinopathy. But there is no threshold for glycosylated hemoglobin below which this risk vanishes [15] [16].

The prevalence of diabetic retinopathy also increases with the age of diabetes to reach, in the best cases, a plateau after 15 to 20 years [13] [14] [15] [16]. However, this retinal complication of diabetes occurs all the more early as the diabetes is poorly controlled [17] and could explain a prevalence of 65% between 5 and 10 years of age of the disease in our study.

In addition to the age of diabetes, and the glycemic balance, the other risk factors for the occurrence or aggravation of diabetic retinopathy were obesity, smoking, dyslipidemia, alcoholism, cataract surgery, sedentary lifestyle, nephropathy and pregnancy (Table 3). Obesity, sedentary lifestyle and moderate alcohol consumption are not consistently found in studies as risk factors for diabetic retinopathy despite their recognized role in the occurrence of diabetes complications [18]. Smoking was found in 47.5% of subjects with diabetic retinopathy in our study. It is indeed a risk factor for progression of diabetic retinopathy [19].

High blood pressure is very often associated with diabetes. In the diabetic patient, arterial hypertension, whether systolic or diastolic, is a risk factor for the occurrence of diabetic retinopathy. This association would be linear with an increase in risk of 3% to 20% for 10 mmHg increase in systolic blood pressure and 2% to 30% in case of a 10 mmHg increase in diastolic blood pressure [20] [21].

As for dyslipidemias, despite the discordant results of some studies, it should be remembered that they constitute risk factors for the occurrence and progression of diabetic retinopathy. Hence the importance of standardizing the lipid balance in diabetics [22] [23] [24].

Diabetic nephropathy is a marker of advanced diabetes. This is a serious micro-vascular complication such as diabetic retinopathy. This explains their frequent correlations [25] [26].

The occurrence of pregnancy in diabetic women is a risk factor for the onset or aggravation of diabetic retinopathy, particularly since there is pre-existing advanced retinopathy, whether there is arterial hypertension or preeclampsia [19] [27].

Table 3. Co-morbidity factors in patients with diabetic retinopathy.

Co-morbidity factors	Frequency	percentage
Obesity	113	56.50
Smoking	95	47.50
High Blood Pressure	86	43.00
Dyslipidemia	83	41.50
Alcoholism	51	25.50
Cataract surgery	38	19.00
Sedentary lifestyle	30	15.00
Nephropathy	22	11.00
Pregnancy	11	5.50

Table 4. Pace of follow-up visits with the diabetologist and ophthalmologist.

	Quarterly	Half-yearly	Annual	>1an
Diabetologist	7.5% (15)	17% (34)	44% (88)	31.5% (63)
Ophthalmologist	5.5% (11)	12% (24)	29.5% (59)	53% (106)

A history of cataract surgery was found in 19% of our patients with diabetic retinopathy. Cataract surgery is a risk factor for the onset or aggravation of diabetic retinopathy. It is therefore imperative to stabilize diabetes before any cataract surgery in diabetics [19] [28].

In addition, our study has revealed a poor medical follow-up of diabetic patients with an annual diabetological consultation at most in 75.5% of patients which led to poor ophthalmological follow-up (Table 4).

So, the poor glycemic balance, and the other co-morbidity factors we studied can explain the early onset of diabetic retinopathy in the study population

5. Conclusion

At the end of this study, we know that the prevalence of diabetic retinopathy was 45%. It predominated in males and was more prevalent in the 40 to 50 age group. Poor glycemic control, obesity, smoking and high blood pressure were the most common risk factors. They explain an early onset of diabetic retinopathy between 5 and 10 years of age. Reducing diabetes blindness requires an awareness of diabetic patients to better diabetological and ophthalmological follow-up. Sensitization and screening campaigns are to be carried out at least annually to improve the management of diabetes and these complications in Abidjan.

Institution of Origin of the Study

Ophthalmology Department of Cocody University Hospital-Abidjan.

Conflict of Interest

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

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