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Original article

Epidemiological Profile and Risk Factors for Retinopathy in Moroccan Type 2 Diabetics

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Abstract

Objective: To evaluate the ophthalmic impact, compare characteristics, and identify risk factors related to diabetic retinopathy (DR) in patients seen for the first time in consultation. ***Patients and methods:*** This descriptive cross-sectional study was conducted during the period from June to December 2018, of a representative sample of 156 diabetics recruited in the department of endocrinology diabetology and metabolic diseases of the Military Hospital of Instruction Mohamed V of Rabat. ***Results:*** Among the 156 patients included in our study, 86 (55.1%) had a normal eye fundus, while 70 (44.8%) had DR. Glycemic control, age of diabetes, as well as diabetic nephropathy and abdominal obesity were risk factors (OR>1, p<0.05), while physical activity and development of lean body mass are protective factors (OR<1, p>0.05) of diabetic retinopathy. ***Conclusion:*** Our study reflects the epidemiological profile of the Moroccan population, where the prevalence of DR remains high, with poor control of risk factors.

Keywords: ***Retinopathy, diabetes, risk factors, maculopathy.***

Introduction

Diabetic retinopathy (DR) is a frequent complication of diabetes. Indeed, despite major advances in screening and treatment, it remains the leading cause of blindness in adults aged between 20 and 65. As a result, good control of risk factors remains essential to improve the visual prognosis of our diabetic patients.

We carried out a study at the Mohammed V Military Training Hospital in Rabat-Morocco, with the primary aim of assessing the ophthalmic impact in Moroccan diabetics seen for the first time in consultation, and then, secondarily, to compare the characteristics and identify the risk factors associated with diabetic retinopathy compared with patients who did not have DR.

Materials and Methods

This is a descriptive cross-sectional study, conducted in the endocrinology department of the Mohammed V military training hospital in Rabat during the period from June to December 2018. Was included in our study; any type 2 diabetic received for the first time in our training; and who had never benefited from a fundus of the eye. And were excluded any type 1 and type 2 diabetic whose aforementioned conditions were not validated, as well as patients who had a corneal opacity or cataract hindering Funduscopic examination.

Data were collected using a questionnaire. All data were transmitted on an Excel file and then transferred for analysis using JAMOVI 1.6 software. Continuous variables were presented as mean or median, while categorical variables were expressed as number and percentage n (%). We used the *t-student, Mann-Whitney, χ2* (or *Fisher's exact test*) to compare differences between patients with diabetic retinopathy and patients without DR. For uni/multivariate analysis, we used logistic regression to adjust for composite criteria. A risk α of less than 0.05 was considered statistically significant.

Results And Analysis

- ***Characteristics of the study population***

The number of participants was 201; 45 patients weré excluded making 156 patients retained for our study. The mean age was 62 +/- 8.12 years, the most represented age group was between 51 and 60 years (52.5%). 51.2% (80) of our sample was male, and 48.8% (76) female. Anthropometric and metabolic characteristics are summarized in Table 1.

- ***Diabetic retinopathy***

Basic features

Of the 156 patients included in our survey, 86 (55.1%) had a normal fundus (NDR), while 70 (44.8%) had DR: non-proliferative (NPDR) in 91% of cases, proliferative (PDR) in 6% and high-risk proliferative (HRPDR) in 3%.

There were no statistically significant differences in gender, mean age, mean body mass index (BMI) or vitamin D status between the DR and NDR groups ($p>0.05$) (see Table 2).

Mean umbilical circumference and fat mass index were significantly higher in the RD group than in the NDR group, while lean mass index was significantly lower in the DR group than in the NDR group ($p<0.05$).

Also, 61.1% of patients in the NDR group (i.e. 69 patients) exercised regularly, while only 38.9% (i.e. 44 patients) in the DR group exercised regularly, the difference being statistically significant ($p=0.035$). As far as diabetes was concerned, the DR group had older and more unbalanced diabetes than the NDR group, and this was statistically significant ($p<0.05$) (Table 2).

Risk factors for diabetic retinopathy in logistic regression

The presence of DR was taken as the dependent variable, and all significant factors, namely BMI, umbilical circumference, fat mass index, lean mass index, physical activity, length of diabetes, diabetic control and microalbuminuria were defined as independent variables. For the logistic regression analysis, glycemic imbalance, diabetes duration, diabetic nephropathy and abdominal obesity were factors associated with the development of DR, while physical activity and lean body mass were protective factors (Table 3).

Table 1: Characteristics of the study population.

Parameters	**Mean+/- Standard deviation**
BMI (Kg/m2)	**28.4 +/- 6.1**
Umbilical perimeter (cm)	**95.5 +/- 11.3**
Mass index	
Grasse (%)	**11.6 +/- 4.44**
Lean (%)	**17.4 +/- 2.6**
HTA	**59 (37.8%)**
Dyslipidemia	**89 (57.05%)**
History of smoking	
Never	**132 (84.6%)**
Weaned	**15 (9.6%)**
Always	**9 (5.8%)**
Alcohol	
Never	**148 (94.87%)**
Sometimes	**4 (2.56%)**
Weaned	**4 (2.56%)**
Sedentary lifestyle	**42 (26,9%)**
GAJ	**1,77 +/- 0,655**
HbA1c	
<7,5	**90 (57,69%)**
≥7,5	**66 (42,31%)**
Microalbuminuria	**53 (33,9%)**

Table 2: Characteristics of the diabetic retinopathy and non-diabetic retinopathy groups.

Associated factor	**Diabetic retinopathy**	**Normal fundus**	**p-value**
N=156	70 (44,8%)	86 (56,3%)	
Age (years)	62 +/- 7,5	61,2 +/- 8,4	0,17
Gender			0,3
Men	31 (38,7%)	49 (61,3%)	
Women	39 (51,4%)	37 (48,6%)	
BMI (Kg/m^2)	28,52 +/- 4,97	27,1 +/- 6,44	0,4
Umbilical perimeter (cm)	99,7 +/- 9,8	92,2 +/- 10,9	**0,04**
Body fat (%)	42,6 +/- 9,5	34,99 +/- 12,2	**0,03**
Lean mass (%)	47,55 +/- 7,8	46,9 +/- 8,2	**0,033**
Smoking			0,86
Never	60 (45,4%)	72 (54,6%)	
Weaned	6 (42,8%)	8 (57,2%)	
Assets	4 (40%)	6 (60%)	
Alcohol			0,26
Never	65 (43,6%)	84 (56,4%)	
Occasional	3 (75%)	1 (25%)	
Always	2 (66,7%)	1 (33,3%)	
Physical activity			**0,035**
YES	44 (38,9%)	69 (61,1%)	
NO	26 (60,5%)	17 (39,5%)	

Age of diabetes (years)	15,3 +/- 7,2	8,77 +/- 5,98	**<0,001**
HbA1c (%) **<7.5** **≥7,5**	 20 (40%) 50 (47,2%)	 30 (60%) 56 (52,8%)	**0,02**
fasting glycemia (g/l)	2,03 +/- 0,55	1,79 +/- 0,7	0,68
Diabetes treatment **Oral antidiabetics alone** **« Bed-Time » diagram** **Basal plus, 2 plus or Bolus**	 35 (46,1%) 10 (45,5%) 25 (43,1%)	 41 (53,9%) 12 (54,5%) 33 (56,9%)	0,4

Table 3: Risk factors associated with diabetic retinopathy.

Parameter	OR	IC95%		P value
		Lower	Upper	
HbA1c	2,21	1,06	4,61	0,02
Age of diabetes	1,16	1,1	1,34	<0,001
Microalbuminuria	8,06	3,3	19,1	<0,001
IR stage	11,3	3,5	34,5	<0,001
Physical activity	0,48	0,17	0,98	0,036
Umbilical perimeter	1,05	1	1,084	0,041

Discussion

Prevalence of DR

Diabetic retinopathy is one of the most serious complications of diabetes. It is considered the main cause of blindness in working age, and is responsible for serious personal and socio-economic consequences. According to one metanalysis, its prevalence is estimated at 35%, 12% of which threatens vision [1]. This result is somewhat lower than the 44.8% found in our study, which is in line with the 44% reported by a study in the Fes region [2], versus the 39.7% reported by Rabi Andaloussi. Z *et al.* [3], while Kempen JH *et al.* and Antonetti DA *et al.* reported rates of 40.3% and 40% respectively [4,5].

In fact, there is considerable heterogeneity in the distribution of DR prevalences across the world and within the same country, this was highlighted by a recent meta-analysis carried out in 2015, which reported that Asian countries had the lowest prevalence of DR, in contrast to Western countries and the United States where the highest rates were recorded [6].

- **Risk factors linked to the development of DR**

Several factors are associated with the development and progression of DR, some identified through several studies, and others are still discussed, in our study; the factors that increase the risk of developing DR are:

- **Balance and length of diabetes**

Patients with HbA1c above 7.5% had a 2-fold increased risk compared with patients with controlled diabetes. This result is in line with the findings of the DCCT intervention studies [7] and the United Kingdom Prospective Diabetes Study (UKPDS) [8], which demonstrated the beneficial role of good glycemic control on the incidence and progression of DR.

Long-standing diabetes is also an important risk factor for the development of DR, and in our study was associated with an increased risk of DR. The same finding has been demonstrated in several studies, which have shown that people diagnosed recently (recent diabetes) had a lower prevalence of diabetic retinopathy than those diagnosed earlier (older diabetes) [9-11].

- **Diabetic kidney disease**

Several studies have shown an association between the prevalence of diabetic nephropathy and diabetic retinopathy [12,13]. In our study, the presence of microalbuminuria increased the risk of developing DR by a factor of eight. This has been confirmed by several studies, according to which microalbuminuria is a factor in the onset and progression of DR [14].

- **Physical activity**

However, there is little epidemiological data describing the relationship between diabetic retinopathy and physical activity. Some teams suggest that there is no relationship between physical activity and the development or progression of DR [15-17]; while women who participated in team sports were less likely to suffer from proliferative diabetic retinopathy according to Cruickshanks KJ and team [18].

- **Abdominal obesity**

Several recent studies have highlighted the existence of a link between a high body mass index (BMI) and the development of DR [19]; in our study, this link was not statistically significant. However, in our study, a high waist circumference was a factor favouring the development of DR. This result is in line with that of a Chinese team who demonstrated that type 2 diabetics with a low or normal BMI and a high umbilical circumference have a greater risk of developing diabetic retinopathy OR: 1.44; 95% CI [1.17-1.78] [20].

According to our results; a high fat mass index was a risk factor for developing DR with OR: 1.044; 95% CI [1.0013-1.085]; p=0.03, while a high lean mass index was a protective factor OR: 0.95; 95% CI [0.912-0.998]; p=0.03.

- **Other risk factors linked to the development of DR that were not significant in our study**

Although proven by several studies [8,9], the link between hypertension and dyslipidemia was not significant in our study.

Smoking, alcohol consumption and Vit D deficiency, factors whose link to DR is still debated in the literature, were also not linked to a high risk of DR in our study.

- **Diabetic maculopathy**

As diabetic maculopathy (DM) was not present in any of our patients, we suggest that metformin, which was part of the antidiabetic treatment in all our patients, is a protective factor against DM. This has been suggested in some publications [21], but further studies are needed to prove this beneficial link.

Conclusion

At the end of our study, we can conclude that retinopathy has a high prevalence, in line with that of developing countries, which can be explained by difficult access to care and poor control of risk factors. The latter include glycemic control, long-standing diabetes, diabetic nephropathy and abdominal obesity. Physical activity and the development of lean body mass are protective factors.

Greater awareness among the diabetic population and close multidisciplinary collaboration would enable early detection and better follow-up.

Conflicts of Interest

All authors declare that they have no conflicts of interest.

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