



Clinical and metabolic predictors of nonproliferative and proliferative/laser-treated retinopathy in normoalbuminuric type 1 diabetic patients with normal or mildly impaired renal function



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INTRODUCTION

Identification of the determinants of the onset of early diabetic retinopathy is essential for reducing the morbidity and mortality associated with diabetes. Many studies have identified poor glycemic control, duration of diabetes and blood pressure as most important risk factors for development of retinopathy. It is assumed that retinopathy and nephropathy, as most important microvascular complications in diabetes, occurs at the same time and that retinovascular pathology reflects renal disease. However, several studies demonstrated that albuminuria is not a risk factor for diabetic retinopathy and that retinopathy might be present already in normoalbuminuric state in type 1 diabetic patients (T1DM). The aim of this study was to evaluate the prevalence and predictors of nonproliferative (NPR) and proliferative/laser-treated retinopathy (PR) in normoalbuminuric T1DM.

SUBJECTS AND METHODS

Study included 333 (198 without retinopathy, 135 with NPR and PR) normoalbuminuric T1DM before any interventions with statins, ACE inhibitors or angiotensin II receptor blockers. eGFR was calculated using the Chronic Kidney Disease Epidemiology Collaboration (CKD-EPI) formula. Microalbumin was measured spectrophotometrically by turbidimetric immuno-inhibition. Diagnosis of retinopathy was made by fundoscopy after pupillary dilatation.

RESULTS

The average age was approximately 34 years, most were not overweight and 51% of subjects were female. Mean/median values of BMI, WHR, systolic blood pressure, diastolic blood pressure, total, HDL cholesterol, and triglycerides were within the normal range for patients with diabetes with slightly elevated levels of HbA1c and LDL cholesterol. The mean GFR estimated by the CKD-EPI was 107 ml min⁻¹ 1.73m⁻². Patients without retinopathy compared to those with NPR and PR were younger (32.9 vs 39.9 years, p<0.001), had longer duration of diabetes (8.6 vs 19.6 years, p<0.001), lower hemoglobin A1c (7.2 vs 7.8%, p<0.001), lower total cholesterol (4.9 vs 5.2 mmol/L, p=0.01), lower LDL cholesterol (2.8 vs 3.0 mmol/L, p=0.04) lower heart rate (HR) (71 vs 79 beats/min, p<0.001), lower albuminuria (11.4 vs 13.4 mg/24h, p=0.01) and higher eGFR (108 vs 103 ml/min, p=0.005). Stratifying clinical and metabolic characteristics of patients for degree of eGFR, trends across quartiles for age (43 vs 23 years, p<0.001), duration of diabetes (17 vs 9 years, p<0.001), hemoglobin A1c (7.1 vs 8.4%, p=0.002), total cholesterol (5.1 vs 4.6 mmol/L, p=0.02), and LDL cholesterol (2.9 vs 2.4 mmol/L, p=0.006) were statistically significant.

Table 1: Clinical and metabolic characteristics of patients without and with retinopathy

	Without	With
	RETINOPATHY	
Age (years)	32.9	39.9
BMI (kg/m ²)	23(17-34)	24 (15-37)
Disease duration (years)	8.6 6.8	19.6 8.1
Hemoglobin A1c (%)	7.2 1.5	7.8 1.6
Total cholest. (mmol/L)	4.9 0.8	5.2 0.9
LDL cholest. (mmol/L)	2.8 0.7	3.0 0.8
HDL cholest. (mmol/L)	1.6 0.4	1.7 0.3
Tryglicerides (mmol/L)	0.9 0.2	0.9 0.2
SBP (mmHg)	120(90-180)	120 (80-180)
DBP (mmHg)	80(50-110)	80 (60-110)
Heart rate (beats/min)	71 12	79 13
UAE (mg/24h)	11.4 6.9)	13.4 7.5
Estimated GFR (ml/min)	108 15	103 16

Abbreviations: SBP, systolic blood pressure; DBP, diastolic blood pressure; UAE, urinary albumin excretion rate.

DISCUSSION

In conclusion, our results suggest that retinopathy is present and may progress in patients with type 1 diabetes even when coexisting renal disease is excluded. This points to the need for close monitoring of normoalbuminuric patients with type 1 diabetes aimed at early detecting, preventing or limiting the progression of retinopathy, especially in older T1DM with longer duration of diabetes, hemoglobin A1c, total and LDL cholesterol.

