THE INFLUENCE OF RENAL FUNCTION ON CATARACT DEVELOPMENT IN TYPE 2 DIABETES

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Introduction and aim

Cataract is the most common cause of preventable blindness worldwide. **In patients with diabetes, cataract occurs at a younger age and progresses more rapidly than senile cataract**, resulting in higher rates of cataract surgery at a quite young age and poorer vision outcomes, especially in eyes with active proliferative retinopathy and preexisting macular edema. The pathogenesis leading to lens opacification in diabetes is still insufficiently understood and presumed to involve diabetic complications risk factors. **This study aimed to investigate the role of diabetes duration, metabolic risk factors, and renal function in cataract development in type 2 diabetes (T2DM).**

Patients and methods

This cross-sectional study included 107 T2DM patients (67M/40F) with a mean age of 66.74±8.01 years and a mean diabetes duration of 15.05±5.69 years. **Metabolic risk factors**: glycated hemoglobin (HbA_1c), total cholesterol, HDL cholesterol, LDL cholesterol, and triglycerides were determined using routine laboratory methods. **Blood pressure** was measured with a mercury sphygmomanometer after a 10-minute resting period. **Renal function** was determined using serum creatinine, estimated glomerular filtration rate (eGFR), and albumin/creatinine (A/C) ratio. **The ophthalmologic examination** included best corrected visual acuity (BCVA), biomicroscopy of the lens, indirect slit lamp fundoscopy, and color fundus photography of two fields (macular field, disc/nasal field) of both eyes according to the EURODIAB retinal photography methodology. Lens opacity was graded using the Lens Opacity Classification System version III (LOCSIII).

Results

According to the LOCSIII, patients were divided into three groups: group 1 - patients with clear crystalline lens (n=16), group 2 - patients with initial cataract (NO1-NO2, NC1-NC2, C1-C2, P1-P2; n=74), and group 3 - patients with immature cataract (NO3-NO4, NC3-NC4, C3-C4, P3-P4; n=17).

The three groups did not differ in age, gender, diabetes treatment, SBP, total cholesterol, HDL, LDL cholesterol, and triglycerides.

Group 3 had significantly longer diabetes duration (17.12 ± 6.38 *vs.* 10.81 ± 4.09 years; p<0.001), marginally higher HbA_1c (7.11 ± 1.06 *vs.* 6.38 ± 0.82%; p=0.052) and significantly higher DBP (90.94 ± 15.41 *vs.* 76.47 ± 6.32 mmHg; p=0.001) than group 1.

Diabetic retinopathy (DR) was significantly more severe (35/ 29/ 36 *vs.* 82/ 6/ 12%; p=0.047) and eGFR significantly lower (53±8 $mlmin^{-1}1.73m^{-2}$ *vs.* 72±12 $mlmin^{-1}1.73m^{-2}$; p=0.017) in group 3 than in group 1.

Table 1. Correlation between cataract and diabetes duration, diastolic blood pressure, renal function, and retinopathy in patients with type 2 diabetes (n=107).

	Cataract		
	Spearman R	t(N-2)	p
DM duration (yrs)	0.299	3.219	**0.002**
DBP (mmHg)	0.298	3.203	**0.002**
A/C ratio (mg/mmol)	0.196	2.049	**0.042**
Diabetic retinopathy	0.249	2.640	**0.009**

Table 2. Risk factors and predictors for cataract development in patients with type 2 diabetes using univariate and multiple logistic regression analyses.

Variable	OR (95% CI)	p	AOR (95% CI)*	P*
DM duration	1.23 (1.07-1.41)	**0.003**	/	/
HbA_1c	1.65 (1.07-2.53)	**0.022**	/	/
DBP	1.08 (1.03-1.13)	**0.002**	1.06 (1.00-1.12)	**0.039**
eGFR	3.31 (1.34-8.22)	**0.008**	3.02 (1.07-8.49)	**0.034**

* OR after adjustment for diabetes duration and HbA_1c

Conclusions

This study showed that renal function determined using the A/C ratio and eGFR, along with diabetes duration, hemoglobin A_1c, and blood pressure, play an essential role in cataract development in type 2 diabetes. These findings point to the need for even more reducing risk factors to prevent not only nephropathy but also cataract to improve the quality of life of diabetics and reduce the economic burden due to disability and surgery related to cataract.