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Diabetic Retinopathy is a Prognostic Factor for Progression of Chronic Kidney Disease in the Patients with Type 2 Diabetes Mellitus

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Objectives: Although both retinopathy and nephropathy are major diabetic microvascular complications, a few studies have examined the relationship between retinal structural changes and renal functions in patients with diabetes. Therefore, we investigated whether severity of diabetic retinopathy (DR) has adverse effects on renal function and albuminuria in the patients with type 2 diabetes mellitus (DM).

Methods: We screened 2,197 adult patients with type 2 DM who had undergone fundus exam between August 2006 and February 2014. Among them, 1,602 subjects with available serial renal function and albuminuria measurement were included in the analysis. DR status was classified as no DR, non-proliferative DR (NPDR), and proliferative DR (PDR). The risk of renal function decline and albuminuria progression was assessed according to DR severity.

Results: A total of 387 (24.2%) patients had NPDR and 204 (12.7%) had PDR at either eye. The mean follow-up period was 5.6±2.1 years. DR was associated with lower body mass index, lower plasma hemoglobin, lower serum albumin level, longer duration of DM, poorer control of blood sugar, lower estimated glomerular filtration rate (eGFR), and greater amount of albuminuria. During mean follow-up duration of 5.6±2.1 years, baseline DR severity was associated with faster renal function decline (Figure 1). In multivariate analysis, NPDR had 2.3 times and PDR had 5.5 times higher risk for CKD progression (Table 1).

Conclusions: Our findings demonstrated that baseline DR severity is a prognostic factor for future CKD progression in type 2 DM patients. Therefore, clinicians must evaluate DR severity at the first visit and closely monitor renal function and albuminuria in the subjects with severe DR.

Figure1, Annual renal function decline rate according to initial diabetic retinopathy status

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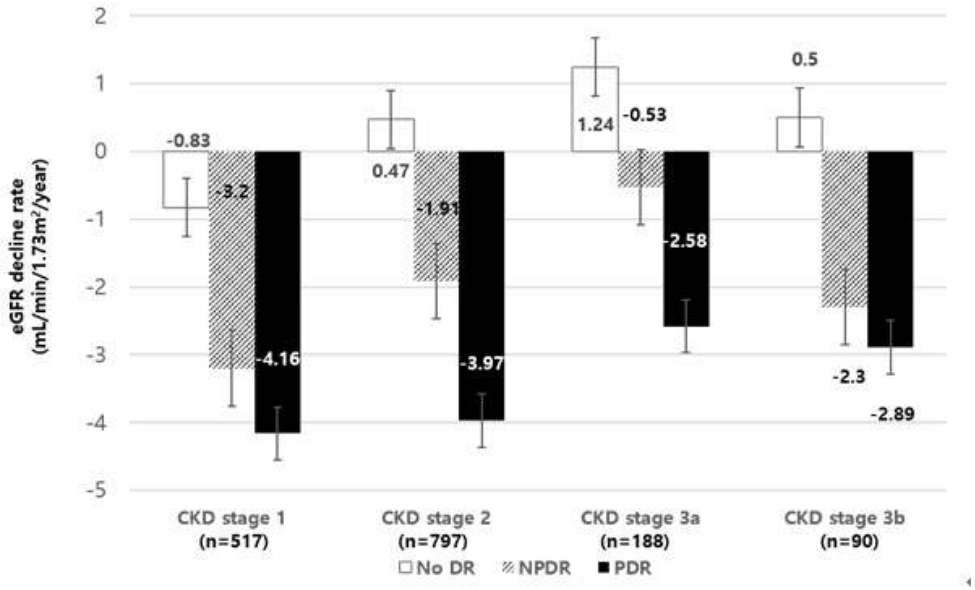

Table1. Multiple logistic regression analysis for prediction of CKD progression

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Parameter	Odds ratio	Confidence interval	p-value
Baseline eGFR <60 mL/min/1.73m^2	2.068	1.062-4.027	0.033
Baseline UACR ≥30 mg/g	3.314	1.847-5.947	<0.001
Albumin <4.0 g/dL	2.840	1.495-5.394	0.001
NPDR (vs. no DR)	2.910	1.602-5.285	<0.001
PDR (vs. no DR)	16.582	2.431-113.123	0.004
DR progression	1.213	0.631-2.330	0.563
Hemoglobin <10 g/dL	1.849	0.619-5.520	0.271
HbA1c ≥7.0 %	1.703	0.901-3.218	0.101
BMI <25 kg/m^2	1.642	0.942-2.860	0.08
DM duration ≥10years	0.978	0.537-1.780	0.942
Use of ACEi or ARB	1.121	0.625-2.009	0.702