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Clinical implications of diabetic retinopathy in patients with histologically diagnosed diabetic nephropathy

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Objectives : It is challenging to distinguish diabetic nephropathy (DN) from other glomerular diseases in diabetic patients without diabetic retinopathy (DR). The aim of this study was to compare the clinical, laboratory, and pathological differences between patients with and without DR in those with histologically diagnosed DN.
Methods : We investigated clinical, laboratory, and pathological findings of 121 patients with type 2 diabetes who were diagnosed as DN through kidney biopsy.
Results : Among the participants, 79 (65.2%) had DR and 42 (34.8%) showed no evidence of DR. Compared to patients without DR, patients with DR were younger ($p = 0.004$), and had a higher prevalence of diabetic neuropathy ($p = 0.002$) and peripheral edema ($p = 0.014$). In laboratory findings, patients with DR had lower hemoglobin (g/dL, $p = 0.001$), serum albumin (g/dL, $p = 0.001$), complement 3 levels (mg/dL, $p = 0.027$); higher platelet distribution width (PDW, fl, $p = 0.026$), serum creatinine (mg/dL, $p = 0.029$), cystatin C (mg/L, $p < 0.001$), uric acid (mg/dL, $p = 0.016$), urine protein to creatinine ratio (mg/g, $p < 0.001$), serum potassium (mEq/L, $p = 0.002$), total cholesterol (mg/dL, $p = 0.044$) and low density lipoprotein (mg/dL, $p < 0.001$). In pathological findings, patients with DR had a higher grade of pathological classification of DN ($p = 0.009$). Moreover, a multivariable analysis revealed that a higher PDW was significantly associated with DR (OR: 1.374, 95% CI: 1.030-1.833, $p = 0.031$).
Conclusions : The presence of DR in diabetic patients may be associated with severe kidney damage. In addition, a higher PDW is be more likely to be accompanied by DR, which in turn may be related to severe microvascular complications. Given this, it is possible that there are slightly different mechanisms contributing to DN in diabetic patients without DR compared to those with DR.

Table 1.png

Table 1. Comparison of clinical, laboratory, and pathological findings between patients with and without diabetic retinopathy in those with histologically diagnosed diabetic nephropathy.

Variable	Patients without DR (N = 42)	Patients with DR (N = 79)	P value
Clinical profiles			
Age, years	58.14 ± 2.09	50.81 ± 1.45	**0.004**
Sex, male	22 (52.3)	51 (64.5)	0.134
Body weight (kg)	68.90 ± 1.89	70.71 ± 1.88	0.587
Height (cm)	163.01 ± 1.47	167.25 ± 1.07	0.025
BMI (kg/m^2)	25.87 ± 0.59	25.11 ± 0.51	0.559
DM duration, years	9.08 ± 1.27	11.62 ± 0.85	0.093
Hypertension	35 (83.3)	69 (87.3)	0.364
Brain infarction	5 (11.9)	4 (5.0)	0.158
Coronary artery disease	5 (11.9)	4 (5.0)	0.158
Peripheral artery disease	1 (2.3)	3 (3.7)	0.568
DM neuropathy	4 (9.5)	27 (34.1)	**0.002**
Peripheral edema	16 (38.0)	48 (60.7)	**0.014**
Dyslipidemia	33 (78.5)	56 (70.8)	0.245
Mean kidney size (cm)	10.78 ± 0.15	11.05 ± 0.12	0.173
Laboratory findings			
WBC (10E3/uL)	8.16 ± 0.60	7.79 ± 0.29	0.531
Hemoglobin (g/dL)	11.94 ± 0.36	10.62 ± 0.20	**0.001**
RDW (%)	12.99 ± 0.18	13.06 ± 0.10	0.708
Platelet (10E3/uL)	290.98 ± 16.11	265.23 ± 8.70	0.127
MPV (fl)	11.78 ± 1.96	10.14 ± 0.10	0.255
PDW (fl)	10.79 ± 0.25	11.55 ± 0.20	**0.026**
Total bilirubin (mg/dL)	0.43 ± 0.07	0.30 ± 0.03	0.091
Albumin (g/dL)	3.67 ± 0.11	3.23 ± 0.08	**0.002**
Creatinine (mg/dL)	1.59 ± 0.22	2.19 ± 0.15	0.029
Cystatin C (mg/L)	1.46 ± 0.12	2.22 ± 0.10	**<0.001**
eGFR (CKD-EPI)	61.32 ± 4.62	44.08 ± 2.87	**0.001**
Uric acid (mg/dL)	5.89 ± 0.26	6.73 ± 0.20	**0.016**
K (mmol/L)	4.09 ± 0.09	4.53 ± 0.08	**0.002**
tCO2 (mmol/L)	25.17 ± 0.48	25.25 ±1.12	0.961
C reactive protein (mg/dL)	0.53 ± 0.16	0.39 ± 0.09	0.447
Total cholesterol (mg/dL)	167.00 ± 13.60	196.11 ± 7.49	**0.044**
LDL (mg/dL)	83.4 ± 7.70	128.65 ± 8.03	**<0.001**
Triglyceride (mg/dL)	231.68 ± 26.57	194.73 ± 14.83	0.191
HDL (mg/dL)	42.85 ± 1.98	50.78 ± 2.19	**0.019**
HbA1c (%)	7.98 ± 0.31	7.58 ± 0.23	0.325
Urine PCR (mg/g)	2982.27 ± 416.94	6086.61 ± 549.47	**<0.001**
IgG (mg/dL)	1068.21 ± 53.56	920.01 ± 47.02	0.051
IgA (mg/dL)	253.89 ± 16.28	245.52 ± 10.97	0.663
IgM (mg/dL)	86.75 ± 7.36	92.44 ± 6.40	0.583
C3 (mg/dL)	121.64 ± 4.52	110.65 ± 2.66	**0.027**
C4 (mg/dL)	30.98 ± 1.71	30.84 ± 0.97	0.936
Pathologic findings			
DN classification, class	I, - IIa, 10 (23.8) IIb, 7 (9.5) III, 14 (33.3) IV, 10 (23.8)	I, - IIa, 6 (7.5) IIb, 5 (6.3) III, 41 (51.9) IV, 27 (34.1)	**0.009**
Combined with other glomerulonephritis	7 (16.7)	9 (11.3)	0.295
Diffused foot process effacement	18 (42.8)	45 (57.0)	0.174
Immunofluorescent staining			
IgG	16 (38.0)	53 (67.0)	**0.005**
IgA	5 (11.9)	3 (3.8)	0.080

Table 1.png

Table 2. Multivariable logistic regression analysis for factors associated with diabetic retinopathy.

Variable	OR (95% CI)	P value
Age, years	1.374 (1.030-1.833)	**0.031**
Sex, male	1.479 (0.598-3.661)	0.397
Hypertension	1.091 (0.298-3.998)	0.895
Dyslipidemia	0.943 (0.342-2.604)	0.910
Diabetic neuropathy	4.175 (1.253-13.912)	**0.012**
Serum creatinine (mg/dL)	1.537 (1.253-2.333)	**0.043**
PDW (fl)	1.374 (1.030-1.833)	**0.031**

Abbreviations: PDW, platelet distribution width