Abstract

Background: Early identification of youth with type 1 diabetes (T1D) at risk for diabetic kidney disease may improve clinical outcomes. We examined the cross-sectional relationship between kidney biomarkers neutrophil gelatinase-associated lipocalin (NGAL), copeptin, interleukin-18 (IL-18), kidney injury molecule-1 (KIM-1), chitinase-3-like protein-1 (YKL-40), and monocyte chemoattractant protein-1 (MCP-1), and intrarenal hemodynamic function in adolescents with T1D.

Methods: Urine albumin-to-creatinine ratio (UACR), renal vascular resistance (RVR), glomerular filtration rate (GFR), intraglomerular pressure (P_{GLO}), efferent arteriole resistance (R_E), afferent arteriolar resistance (R_A), and renal plasma flow (RPF), and the above indicated biomarkers were assessed in youth aged 12-21 years with and without T1D of <10 years duration.

Results: Fifty adolescents with T1D (16.1±3.0 years, HbA1c 8.6±1.2%) and 20 adolescents of comparable BMI without T1D (16.1±2.9 years, HbA1c 5.2±0.2%) were enrolled. Adolescents with T1D demonstrated significantly higher GFR, RPF, R_E, and P_{GLO} than controls (39%, 33%, 74%, and 29%, respectively, all $p<0.0001$). Adolescents with T1D also exhibited significantly lower RVR and R_A than controls (25% and 155%, respectively, both $p<0.0001$). YKL-40 and KIM-1concentrations, respectively, were positively associated with GFR (r: 0.43, $p=0.002$; r: 0.41, $p=0.003$), RPF (r: 0.29, $p=0.08$; r: 0.34, $p=0.04$), UACR (r: 0.33, $p=0.02$; r: 0.50, $p=0.0002$), and P_{GLO} (r: 0.45, $p=0.006$; r: 0.52, $p=0.001$) in adolescents with T1D.

Conclusions: Higher concentrations of biomarkers YKL-40 and KIM-1 may help define the risk for intraglomerular hemodynamic dysfunction in youth with T1D.