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\text{GLO}), efferent arteriole resistance (R\text{E}), afferent arteriolar resistance (R\text{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\text{E}, and P\text{GLO} than controls (39%, 33%, 74%, and 29%, respectively, all p<0.0001). Adolescents with T1D also exhibited significantly lower RVR and R\text{A} than controls (25% and 155%, respectively, both p<0.0001). YKL-40 and KIM-1 concentrations, 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\text{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.