

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 $8.6 \pm 1.2\%$) and 20 adolescents of comparable BMI without T1D (16.1 ± 2.9 years, HbA1c $5.2 \pm 0.2\%$) 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-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_{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.