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Serum LDH level is Associated with Decreased eGFR and Proteinuria

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Lactate dehydrogenase (LDH) is expressed in almost all human tissues and it is released into the blood stream during cellular injury. Although LDH is expressed in the kidney, the relationship between serum LDH or renal expression of LDH and kidney diseases has not yet been established. We investigated the relationship between serum LDH level and estimated glomerular filtration rate (eGFR) or proteinuria in patients with glomerulonephritis (GN). We also investigated the protein expression of LDH in the kidney of experimental renal ischemia/reperfusion (I/R) injury and puromycin aminonucleoside (PAN)-induced nephrotic syndrome. We conducted a retrospective study of patients with GN diagnosed by kidney biopsy (n=104) and control patients (n=28). We analyzed clinical parameters including serum LDH, CKD-EPI eGFR, serum albumin and proteinuria by using one-way ANOVA, post hoc Tukey HSD test, Pearson's correlation coefficient, stepwise multiple linear regression. Renal I/R injury in mice was induced by clamping of both renal pedicles for 25 min. PAN-induced nephrotic syndrome in rats was induced by a single intravenous injection of PAN via the femoral vein. Serum LDH level is increased in patients with severe proteinuria compared with the control patients (358.4±9.3 vs. 515.0±24.0 U/L, p<0.05). Serum LDH is also increased in patients with eGFR less than 60 mL/min/1.73m² (358.4±9.3 vs. 523.0±26.2 U/L, p<0.05). Serum LDH level was correlated with eGFR (r=-0.433, p<0.001), 24 h urine protein (r=0.478, p<0.001), and serum albumin (r=-0.432, p<0.001). Linear regression analysis showed eGFR and proteinuria were independent predictors of serum LDH level. The protein expression of LDH was increased in the kidney of mice with renal I/R injury and rats with PAN-induced nephrotic syndrome. In conclusion, serum LDH level is increased in patients with decreased eGFR and severe proteinuria, which may be attributed to increased renal expression of LDH during renal injury.

Key Words: LDH, GFR, Nephrotic syndrome