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The clinical usefulness of urine RBC distribution in children with hematuria

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Objectives : Urine RBC distribution (URD) is an automated diagnostic method for analyzing the size and morphology red blood cells (RBC) in urine to assist in the differential diagnosis of hematuria. Compared to the conventional manual RBC morphology test, it is a more objective and time-efficient automated method. This study was designed to evaluate the clinical usefulness of URD compared with RBC morphology test in pediatric patients with hematuria.
Methods : This study included patients under 18 years of age with hematuria (>5 RBCs/μL on microscopic urinalysis) who were simultaneously tested for RBC morphology and URD analysis using the UF-5000 (Sysmex, Kobe, Japan) at Kyungpook national university hospital from March 2021 to July 2025. URD is calculated by small RBC/ (large RBC+ smal RBC)x100.
Results : In total 246 patients, URD (%) exhibited a significant correlation with dysmorphic RBCs (dRBC, ρ = 0.790). In contrast, it showed no significant correlation with either the urine protein-to-creatinine ratio (ρ = -0.031) or the urine calcium-to-creatinine ratio (ρ = -0.084). ROC curve analysis was performed on patients diagnosed with glomerular hematuria (N=46) and non-glomerular hematuria (N=22). The AUCs for URD (%) and dRBC (%) was 0.940 and 0.891, respectively. With optimal cut-off values of 38.65% for URD (%) and 42.5% for dRBC (%), the sensitivity of 97.6% and 90.2% and specificity of 90.9% and 86.4% were obtained, respectively.
Conclusions : URD (%) demonstrated comparable or even superior diagnostic performance to conventional dRBC (%) in distinguishing between glomerular and non-glomerular hematuria. Its rapid and objective nature suggests it could be a more valuable diagnostic tool.