

Abstract Type : Oral

Abstract Submission No. : OR-1314

Urinary exosomal microRNA-21 as a marker of scrub typhus associated acute kidney injury

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Objectives: Extracellular vesicles contain various molecules including DNA, mRNA, and microRNA (miRNA), and are involved in cell-to-cell communication. MiRNA-21 is reported to be a biomarker for detection of acute kidney injury (AKI). The aim of this study is to investigate the clinical significance of urinary exosomal miRNA-21 for AKI in patients with scrub typhus.

Methods: In a cross-sectional study, we collected 138 urine samples at the time of admission from 145 patients with scrub typhus. For 25 patients with scrub typhus-associated AKI and 25 age, sex-matched patient without AKI, we measured miRNA-21 in urinary exosomal fraction. Then, we investigated correlation between urinary exosomal miRNA-21 and clinical parameters.

Results:

Compared with patients in the non-AKI group, patients in the AKI group had worse renal function (30 ± 13 vs. 56 ± 20 mL/min/1.73m², $P < 0.01$) at admission and higher total leukocyte counts (10.4×10^3 /mL vs. 5.2×10^3 /mL, $P < 0.01$). Serum NGAL (404 ± 269 vs. 104 ± 51 ng/mL, $P < 0.01$) and urine NGAL/creatinine values (371 ± 672 vs. 37 ± 57 ng/mg, $P < 0.01$) were higher in the AKI group than in the non-AKI group. The levels of urinary exosomal miRNA-21 (17.8 ± 1.8 vs. 20.1 ± 1.2 Δ Ct value of miRNA-21, $P < 0.01$) were higher in the AKI group than in the non-AKI group. Urinary exosomal miRNA-21 levels correlated directly with total leukocyte counts and serum NGAL values and inversely with estimated glomerular filtration rate. The receiver operator characteristics curve analysis for urinary exosomal miRNA-21 showed good discriminative power for detecting scrub typhus-associated AKI, with area under the curve value of 0.887.

Conclusions:

Urinary exosomal miRNA-21 could be a surrogate marker for the diagnosis of scrub typhus-associated AKI.