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High time-averaged Red Cell Distribution Width Predicts Mortality in Patients of Nephrology Outpatients Clinic

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Objectives: Red cell distribution width (RDW) has been shown to be an independent risk factor for death in dialysis patients, but little is known about its clinical implication for mild to moderate chronic kidney disease (CKD) patients.

Methods: A multicenter cohort study of 51,437 adult nephrology outpatients, from 2001 to 2016, was conducted to investigate the association between RDW value and all-cause mortality. The patients diagnosed with end-stage renal disease (ESRD) within 3 months were excluded. The time-averaged RDW values were calculated as the sum/number of periods at periodic intervals. The high RDW group was defined as the upper level of 3rd quartile value(≥13.8%).

Results: The final analysis included a total of 16,417 patients with available baseline kidney function and RDW levels. The ESRD event occurred in 1,933 patients (13.5%) and crude mortality rate was 15.0% (1,806 cases) during median 127.5 months follow-up period. Median baseline RDW was 13.0% (IQR 12.5-13.8%), from minimum 10.0% to maximum 32.1%. The patients with initial high RDW(n=4,302) had history of hypertension and diabetes in 41.6% and 28.6%, respectively. Baseline hemoglobin level and eGFR was significantly lower in the high RDW group than in normal RDW group (Hb, 10.8 vs. 13.0 g/dl, p<0.001; eGFR, 46.4 vs. 61.0 ml/min/ 1.73m^2, p<0.001). Multivariate Cox-proportional hazard regression model adjusted for initial eGFR, age, sex, and hemoglobin demonstrated that high time-averaged RDW group (≥13.8%) had increased risk for mortality (aHR 1.365; 95% CI 1.226-1.520, p<0.001). We presented the linear association between time-averaged RDW and adjusted HR for death, including covariates as time-averaged eGFR and time-averaged hemoglobin levels in the multivariable cox regression model. This risk for mortality of high RDW group showed consistent results regardless of subgroup including age group, gender, presence of anemia, and CKD.

Conclusions: The time-averaged RDW was significantly associated with mortality in patients of nephrology outpatient clinic setting.