

Abstract Type : Oral

Presentation No. : OR 01 DL-12

The combination effect of serum albumin and phosphate levels on all-cause mortality in peritoneal dialysis patients

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Objectives: Low albumin levels and high phosphate levels are well-known risk factors for adverse clinical outcomes in peritoneal dialysis patients. However, interrelationship between two markers is not well elucidated. This study aimed to investigate the combination effect between both albumin and phosphate levels in incident peritoneal dialysis patients.

Methods: In this prospective observational study, a total of 540 incident patients who started peritoneal dialysis from 2000 to 2005 were included. Patients were classified into four groups according to the combination of median levels of serum albumin and phosphate (high albumin [HA]-low phosphate [LP]; HA-high phosphate [HP]; low albumin [LA]-LP; LA-HP). The primary endpoint was all-cause mortality.

Results: The mean age was 59.1 ± 14.0 years and 250 (46.3%) patients were male. The median levels of serum albumin and phosphate were 3.2 and 4.0 mg/dL, respectively. During a mean follow-up of 50.2 months, 203 deaths were recorded. All-cause death occurred in 65 (45.1%) in LA-LP group compared to 46 (35.7%) in HA-LP group, 52 (34.9%) in HA-HP group, and 40 (33.9%) in LA-HP group. The Kaplan-Meier analysis showed that LA-LP group were significantly associated with higher risk of all-cause mortality compared to HA-LP group ($P = 0.01$). In adjusted Cox models with markers related to mineral and bone disease, nutrition, and inflammation, LA-LP group showed highest risk of all-cause mortality in all three models (hazard ratio [HR]=1.91, 95% confidence interval [CI]=1.22-2.99; HR=1.70, 95% CI=1.09-2.67; HR=1.87, 95% CI=1.20-2.89, respectively). Finally, LA-LP group showed highest risk of all-cause mortality in fully adjusted model (HR=1.63, 95% CI=1.03-2.59).

Conclusions: This study shows that coexistence of low serum albumin and low phosphate are associated with highest risk of all-cause mortality in peritoneal dialysis patients. Further studies should be addressed to determine optimal target level of phosphate in patients with low serum albumin.