

Identification of Novel Urinary Biomarkers as Surrogates of Acute Kidney Injury Following Human Self-Poisoning With a New Laundry Detergent in Southern Sri Lanka

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Abstract

Objectives: Deliberate self-poisoning with a 'Laundry Detergent' containing potassium permanganate (KMnO₄) and oxalic acid (H₂C₂O₄) is a major problem in the southern province of Sri Lanka with a case fatality of 8%. Acute kidney injury (AKI) is a severe complication and a renal biomarker that could diagnose AKI before conventional biomarkers (e.g. Creatinine) would help clinical management. The current study aims to determine whether novel renal biomarkers could diagnose AKI earlier with higher specificity and sensitivity than conventional markers.

Methods: Clinical and demographic data were collected from 61 (Male/Female: 28/33) prospective patients. Serial urine and blood samples were collected at 8, 16, 24 and 48 hours post ingestion and 1 and 3 months after discharge. Samples were analyzed for urinary biomarkers: neutrophil gelatinase-associated lipocalin (NGAL), kidney injury molecule-1 (KIM-1), Clusterin and interleukin-18 (IL-18) using enzyme-linked immunosorbent assay (ELISA). Predictive performance of biomarkers was assessed using receiver-operating characteristic (ROC) curves. AKI was diagnosed based on acute kidney injury network (AKIN) criteria.

Results: 43 patients had developed (AKIN1 n=10, AKIN2 n=9, AKIN3 n=24) and baseline characteristics between patients with and without AKI were similar. Area under curve (AUC-ROCs) for diagnosis of AKI using KIM-1, NGAL and Clusterin at 8 hours were 0.72 (95% CI: 0.56 - 0.89), 0.69 (95% CI: 0.52 - 0.86) and 0.77 (95% CI: 0.64 - 0.90) respectively. AUC for KIM-1 elevation at 16 and 24 hours were 0.69 (95% CI: 0.53 - 0.86) and 0.74 (95% CI: 0.59 - 0.89) respectively.

Conclusions: Urinary Clusterin and KIM at 8 hours post ingestion were the most promising early renal biomarkers of AKI following self-poisoning with Laundry Detergent. Further research is required to determine if they add value to the diagnosis of AKI by serum Creatinine