



Acute Kidney Injury in Children with Diabetic Ketoacidosis: Risk Factors and Outcome

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Type 1 diabetes mellitus (Type1DM) is a common chronic metabolic disorder in children requiring regular follow-up for adequate glycemic control and early detection of complications. Acute complication as diabetic ketoacidosis (DKA) accounts for about 20%–40% of cases of new-onset Type1DM, which needs urgent hospitalization and management. This serious condition occurs in those who stop their insulin treatment or are not treated adequately during intercurrent illnesses [1]. Assessment of Worldwide Acute Kidney Injury (AKI), Renal Angina, and Epidemiology (AWARE) study in children and young adults found overall incidence of AKI to be 27%; with severe AKI in 11.6% of children in intensive care settings [2]. Among various etiologies of AKI, DKA is one serious condition causing mortality in these patients. The incidence of AKI in DKA reported to be ranging between 35% and 56.5% [3–7]. The potential risk factors for the development of AKI in these patients are volume depletion during ketoacidosis, large amount of fluid administration as 0.9% sodium chloride leading to hyperchloremia, high blood glucose, acidosis, raised uric acid, glucose-corrected sodium level, higher initial serum urea nitrogen, increased heart rate, pre-existing chronic kidney disease, and older age [4–7].

In this issue of Indian Journal of Pediatrics, the article by Yang et al. [8] reported 90 episodes of DKA in 58 children with Type1DM and AKI was present in a total of 70 hospitalizations (77.8%); of these 20% had stage 1 and 57.7% had stage 2 and 3. The proportion of cases with AKI decreased over 12 h (47.4%) and 24 h (28.3%) of hospitalization following treatment. The longer duration of diabetes and higher anion gap were found as significant risk factors for the development of severe AKI. The severity of DKA had no correlation

with severity of AKI. No patient required kidney replacement therapy and all patients had normal kidney function during the follow-up period (median 4.2 y). However, the study also had certain limitations such as, it was retrospective in nature and analysis was done on a small sample size. Therefore, results could have been affected by the confounding factors, in addition to nonavailability of urine output and baseline serum creatinine data in some of the patients.

As such, patients with repeated DKA episodes have poor treatment compliance and they have volume depletion and various degree of acidosis at admission. Further, higher heart rate, blood glucose and corrected sodium levels due to volume depletion complicate the course of AKI. Presence of stage 2/3 AKI may lead to longer recovery time due to reduction in glomerular filtration rate and persistent acidosis [6]. Patients of DKA with AKI require treatment with prompt correction of fluid deficit, correction of metabolic acidosis, and hyperglycemia; majority of cases may recover with these measures. However, some patients may need additionally kidney replacement therapy (peritoneal dialysis/hemodialysis) also.

There is a significant relationship between AKI and long-term kidney injury. Chen et al. [4], in their study of patients with DKA, aged more than 18 y, reported presence of AKI as a risk factor for long-term mortality; which was 8 times higher in cases with AKI in comparison to those who had no AKI. The DKA patients with AKI showed more than two-fold decline in glomerular filtration rate within 1 y after discharge when compared with non-AKI DKA. The recovery from metabolic acidosis following treatment may be longer in children and adolescents having severe AKI [6]. In conclusion, several risk factors lead to the development of AKI in children with DKA. Presence of AKI, especially in advanced stages, is associated with long-term kidney injury and mortality. This is particularly applicable to children who are already at risk for diabetic nephropathy. They need kidney function assessment in follow-up for early detection of kidney damage. Early recognition and prompt treatment of AKI are essential components in management of patients with DKA.

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Declarations

Conflict of Interest None.

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