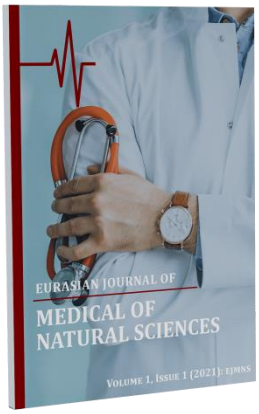
EURASIAN JOURNAL OF MEDICAL AND NATURAL SCIENCES
Innovative Academy Research Support Center
UIF = 8.3 | SJIF = 7.921 www.in-academy.uz



THE EFFECTIVENESS OF USING CAFFEINE CITRATE IN NEONATAL ACUTE KIDNEY INJURY SINGLE CENTER STUDY

Mirzaev S.S.[1]
Murtalibova N.M.[1]
Tojiboev J.Z.[1]
Amanova N.[1]
Nosirova U.F[2]
National Children's Medical Center[1]
Tashkent Institution of Post-Graduate Education[2]
https://doi.org/10.5281/zenodo.11190389

ARTICLE INFO

Received: 06th May 2024
Accepted: 13th May 2024
Online: 14th May 2024

KEYWORDS

AKI, neonates, management acute kidney injury, neonatal, continuous renal replacement therapy, fluid overload, NICU, renal failure, kidney support therapy.

ABSTRACT

Acute kidney injury (AKI) is a common occurrence in the neonatal intensive care unit (NICU). In recent years, our knowledge of the incidence and impact of neonatal AKI on outcomes has expanded exponentially. However, treating AKI in newborns is often challenging due to the functional immaturity of the neonatal kidney.

Introduction. Acute kidney injury occurs commonly in preterm neonates and is associated with increased morbidity and mortality. Although fluid overload and electrolyte abnormalities, as seen in neonatal AKI, are indications for RRT initiation, there is limited evidence that RRT initiated in the first year of life improves long-term outcome.[1,4] Our understanding of this common clinical condition remains limited, as no standardized, evidence-based definition of neonatal AKI currently exists. Non-dialytic management of AKI in these patients may restore appropriate renal function to these patients.[2,3]

Methods. This study was a secondary analysis of the Assessment of Worldwide Acute Kidney Injury Epidemiology in Neonates (AWAKEN) study, a retrospective observational cohort that enrolled neonates born from January 1 to December 31, 2023. The setting was single-center cohort study of neonates admitted to NICU of National Children's Medical Center. There were 10 neonates available for analysis. We used caffeine citrate in order to prevent AKI in term neonates with comorbidities.

Results. The gestational age of the studied children at birth ranged from 32 to 41 weeks (mean age was 37.1±4.1 weeks). Of these, 10 (40.0%) were girls and 14 (60.0%) were boys. Almost all children included in the study were full-term, except 1 (4.16%). Body weight at birth varied from 2400 to 5300 g. (average body weight was 3300±1130). The main diagnosis in 10 children was congenital pneumonia with severe asphyxia at birth, in 3 patients - neonatal sepsis with severe asphyxia at birth, in 1 patient - congenital nephrotic syndrome. The AKI diagnosis was done according KDIGO classification (Table1). Main clinical presentation of patients are shown at table 2. The using of caffeine citrate were as follows:

20-25mg/kg of caffeine citrate loading dose, over 30 minutes and maintenance dose 5-10mg/kg/day.

Table 1

The Kidney Disease: Improving Global Outcomes (KDIGO) definition for AKI in newborns classifies the severity into stages based on changes in SCr and urine output.

Stage	Serum creatinine (SCr) criteria	Urine output criteria (hourly rate)
0	No change in SCr *or* SCr rise < 0.3 mg/dL	≥0.5 ml/kg/h
1	SCr rise ≥ 0.3 mg/dL rise within 48 h *or* SCr rise ≥ 1.5–1.9 × baseline SCr[a]	<0.5 ml/kg/h × 6–12 h
2	SCr rise ≥ 2.0–2.9 × baseline SCr[a]	<0.5 ml/kg/h for >12 h
3	SCr rise ≥ 3 × baseline SCr[a] *or* SCr ≥ 2.5 mg/dL[b] *or* Kidney support therapy utilization	<0.3 ml/kg/h for ≥24 h *or* Anuria for ≥12 h

Table 2

Hyponatremia (123-128 mmol/L)	80% (8)
Hypoalbuminemia (23-26 g/L)	50% (5)
Urine output (0.3-0.5ml/h/kg)	50% (5)
Weight gain (50-100 g)	80% (8)

Conclusion. Caffeine citrate administration in term neonates with comorbidities is associated with reduced incidence and severity of AKI, which allows to improve short – term and long – term outcomes of these children. Further studies should focus on the timing and dosage of caffeine citrate to optimize the prevention of AKI.

References:

1. Bruel A, Rozé JC, Quere MP, et al. Renal outcome in children born preterm with neonatal acute renal failure: IRENEO-a prospective controlled study. Pediatr Nephrol 2016; 31:2365.
2. Nada A, Bonachea EM, Askenazi DJ. Acute kidney injury in the fetus and neonate. Semin Fetal Neonatal Med 2017; 22:90.
3. Maqsood S, Fung N, Chowdhary V, et al. Outcome of extremely low birth weight infants with a history of neonatal acute kidney injury. Pediatr Nephrol 2017; 32:1035.
4. Liu KD, Goldstein SL, Vijayan A, et al. AKI! Now Initiative: Recommendations for Awareness, Recognition, and Management of AKI. Clin J Am Soc Nephrol 2020; 15:1838.
5. Acute Kidney Injury Work Group. KDIGO clinical practice guideline for acute kidney injury. *Kidney Int Suppl.* (2012) 2:1–138.

6. Zappitelli M, Ambalavanan N, Askenazi D, Moxey-Mims M, Kimmel P, Star R, et al. Developing a neonatal acute kidney injury research definition: a report from the NIDDK neonatal AKI workshop. *Pediatr Res.* (2017) 82:569–73. doi: 10.1038/pr.2017.136