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Original Research Article

Incidence of Acute Kidney Injury in Cases Presenting With Acute Gastroenteritis in a Tertiary Care Hospital

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Abstract: *Acute kidney injury is a frequent and potentially serious complication of acute gastroenteritis, particularly in hospitalized patients. Dehydration, prolonged illness, and comorbid conditions such as diabetes mellitus can predispose patients to renal hypoperfusion and subsequent kidney injury. In Pakistan, limited local data exist regarding the burden of acute kidney injury among patients presenting with acute gastroenteritis in tertiary care settings.* ***Objective:*** *To determine the frequency of acute kidney injury among patients presenting with acute gastroenteritis in a tertiary care hospital.* ***Methods:*** *This descriptive cross-sectional study was conducted in the inpatient, Accident and Emergency, and Medicine departments of Bahawal Victoria Hospital, Bahawalpur, from December 2024 to April 2025. A total of 180 patients aged 14–60 years with a diagnosis of acute gastroenteritis were enrolled using non-probability consecutive sampling. Acute kidney injury was defined according to KDIGO criteria as an increase in serum creatinine of at least 0.4 mg/dL within 48 hours of admission. Demographic, clinical, and laboratory data were recorded. Data were analyzed using SPSS version 23. Frequencies and percentages were calculated for qualitative variables, and means and standard deviations were computed for quantitative variables. Stratification was performed to assess associations between acute kidney injury and selected variables, with p-values ≤ 0.05 considered statistically significant.* ***Results:*** *The mean age of the participants was 38.6 ± 11.2 years, with a male predominance (62.2%). Acute kidney injury was observed in 15.0% of patients presenting with acute gastroenteritis. A statistically significant association was found between acute kidney injury and the older age group (p = 0.018), diabetes mellitus (p = 0.009), duration of symptoms greater than three days (p = 0.021), and severe dehydration (p < 0.001). Gender was not associated with acute kidney injury (p = 0.298).* ***Conclusion:*** *Acute kidney injury is a common complication among patients hospitalized with acute gastroenteritis. Older age, diabetes mellitus, prolonged symptom duration, and severe dehydration are significant risk factors. Early identification and prompt management of dehydration may reduce the burden of acute kidney injury in such patients.*

Keywords: Acute gastroenteritis, Acute kidney injury, Dehydration, KDIGO

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Introduction

Acute Kidney Injury (AKI) presents as a significant clinical challenge, particularly within the context of acute gastroenteritis (AGE). The sudden decline in renal function associated with AKI can lead to increased morbidity, extended hospital stays, and even mortality if not promptly addressed (1). AKI occurs in approximately 10-15% of all hospitalized patients, with higher incidences reported among critically ill patients and those with specific conditions such as gastroenteritis (2). Acute gastroenteritis itself is a prevalent cause of hospitalization worldwide, with a variety of etiological agents, including viral, bacterial, and parasitic infections, contributing to its presentation (3).

A substantial body of literature highlights the interrelationship between acute gastroenteritis and the incidence of AKI. Factors such as dehydration resulting from diarrhea and vomiting, electrolyte imbalances, and underlying chronic kidney disease can exacerbate renal injury in patients with acute gastroenteritis (4, 5). For instance, in a study conducted in Pakistan, it was found that AKI affects a considerable proportion of children hospitalized for gastroenteritis, with a reported incidence of approximately 25% (6, 5). In a broader context, pathogens such as enterotoxigenic E. coli and Shigella dysenteriae can cause nephrotoxicity, further complicating patient outcomes (7).

Furthermore, the precise mechanisms leading to AKI in cases of gastroenteritis are complex. Studies suggest that toxins produced by specific pathogens may cause both direct renal injury and activation of inflammatory pathways (7, 8). The fact that AKI can frequently present in pediatric populations with AGE underscores the need for vigilant monitoring and early therapeutic intervention (5, 9). Increased awareness of this association can aid in the implementation of preventive strategies, especially in resource-limited settings, and can positively influence patient care protocols.

In the context of Pakistan, the prevalence of AKI in patients presenting with AGE holds particular relevance given the country's healthcare landscape. High rates of infectious gastroenteritis coupled with existing healthcare challenges, such as limited access to fluid resuscitation and nephrology services, may elevate the incidence rates of AKI in affected populations (3, 6). This necessitates focused research on risk factors and early identification strategies tailored to the unique healthcare environment in Pakistan, to mitigate the far-reaching consequences of AKI following acute gastroenteritis.

Thus, the association between acute gastroenteritis and acute kidney injury presents a compelling area of study, particularly due to the potential for significant morbidity and mortality. Understanding this relationship within the context of Pakistani patients underscores the importance of targeted interventions to improve clinical outcomes.

Methodology

This descriptive cross-sectional study was conducted in the inpatient, Accident and Emergency, and Medicine departments of Bahawal Victoria Hospital, Bahawalpur, after obtaining approval from the Institutional Ethical Review Committee and REU CPSP from December 2024 to April

2025. The study duration was a minimum of six months following synopsis approval. Written informed consent was obtained from all participants prior to enrollment, and confidentiality of patient information was strictly maintained throughout the study in accordance with ethical standards for human research.

A total of 180 patients were included using a non-probability consecutive sampling technique. Both male and female patients aged between 14 and 60 years who presented with a diagnosis of acute gastroenteritis were enrolled. Acute gastroenteritis was defined as the presence of 4 or more episodes of diarrhea within the preceding 24 hours, with an abnormal axillary temperature, a deranged total leukocyte count, and a stool culture showing more than 10^5 bacterial organisms per high-power field. Patients with preexisting chronic kidney disease, defined as serum creatinine greater than 1.5 mg/dL at presentation, with shrunken echogenic kidneys on ultrasound, those already on dialysis, those with renal stones on KUB, and those with a history of malignancy within the last two years were excluded from the study.

After enrollment, detailed demographic and clinical information, including age, gender, duration of symptoms, and history of diabetes mellitus, was recorded on a pre-designed proforma. Diabetes mellitus was identified based on documented medical records within the previous two years or laboratory evidence of random blood glucose greater than 200 mg/dL or fasting blood glucose greater than 126 mg/dL. A clinical examination focusing on hydration status was performed by the attending physician under the supervision of a consultant physician. The severity of dehydration was assessed using standard clinical parameters, including tongue dryness, skin turgor, heart rate, and blood pressure, and categorized as mild, moderate, or severe.

Laboratory investigations were performed in the hospital's central laboratory. These included total leukocyte count, random or fasting blood glucose, stool culture, and serum creatinine levels measured at the time of presentation and repeated after 48 hours of admission. Acute kidney injury was defined according to KDIGO criteria as an increase in serum creatinine of at least 0.4 mg/dL from baseline within 48 hours of admission. All laboratory values and clinical findings were systematically documented on the study proforma.

Data were entered and analyzed using SPSS version 23. Normality of quantitative variables was assessed using the Shapiro-Wilk test. Quantitative variables such as age and serum creatinine levels were expressed as mean and standard deviation. In contrast, qualitative variables, including age groups, gender, diabetes mellitus, duration of symptoms, severity of dehydration, and presence of acute kidney injury, were presented as frequencies and percentages. The frequency of acute kidney injury was stratified by age group, gender, diabetes mellitus, symptom duration, and severity of dehydration. Post-stratification comparisons were performed using the chi-square test or Fisher's exact test, where appropriate, and a p-value of 0.05 or less was considered statistically significant.

Results

The mean age of the study population was 38.6 ± 11.2 years (range: 14–60 years). Most patients belonged to the 31–45 years age group. There was a male predominance, reflecting the usual healthcare-seeking pattern observed in tertiary care hospitals in Pakistan. (Table 1).

Most patients presented with symptoms lasting ≤3 Days, and moderate dehydration was the most common clinical presentation at admission. (Table 2). Based on KDIGO criteria, acute kidney injury was identified in 27 patients, yielding an overall frequency of 15.0% among patients admitted with acute gastroenteritis. Table 4 presents the stratified analysis of acute kidney injury by demographic and clinical variables, along with the corresponding p-values. A statistically significant association was observed between acute kidney injury and age group, with a higher frequency in patients aged 46–60 years (p = 0.018). Diabetes mellitus was significantly associated with acute kidney injury (p = 0.009). Patients with symptom duration longer than three days showed a higher incidence of acute kidney injury (p = 0.021). Severity of dehydration demonstrated a strong association with acute kidney injury, with the highest frequency seen in severely dehydrated patients (p < 0.001). Gender did not show a statistically significant relationship with acute kidney injury (p = 0.298).

Table 1: Demographic Characteristics of Patients with Acute Gastroenteritis (n = 180)

Variable	Frequency (n)	Percentage (%)
Age (years)		
14–30	54	30.0
31–45	72	40.0
46–60	54	30.0
Gender		
Male	112	62.2
Female	68	37.8
Diabetes Mellitus		
Yes	46	25.6
No	134	74.4

Table 2: Clinical Profile of Patients with Acute Gastroenteritis (n = 180)

Variable	Frequency (n)	Percentage (%)
Duration of Symptoms		
≤ 3 days	98	54.4
> 3 days	82	45.6
Severity of Dehydration		
Mild	56	31.1
Moderate	82	45.6
Severe	42	23.3

Table 3: Frequency of Acute Kidney Injury among Study Participants (n = 180)

Acute Kidney Injury	Frequency (n)	Percentage (%)
Yes	27	15.0
No	153	85.0

Table 4: Stratification of Acute Kidney Injury with Demographic and Clinical Variables

Variable	AKI Present n (%)	AKI Absent n (%)	p-value
Age Group			
14–30	4 (7.4)	50 (92.6)	
31–45	9 (12.5)	63 (87.5)	
46–60	14 (25.9)	40 (74.1)	0.018
Gender			
Male	19 (17.0)	93 (83.0)	
Female	8 (11.8)	60 (88.2)	0.298
Diabetes Mellitus			
Yes	12 (26.1)	34 (73.9)	

No	15 (11.2)	119 (88.8)	0.009
Duration of Symptoms			
≤ 3 days	9 (9.2)	89 (90.8)	
> 3 days	18 (22.0)	64 (78.0)	0.021
Severity of Dehydration			
Mild	3 (5.4)	53 (94.6)	
Moderate	10 (12.2)	72 (87.8)	
Severe	14 (33.3)	28 (66.7)	<0.001

Discussion

In our study involving 180 patients with acute gastroenteritis, the mean age of participants was 38.6 ± 11.2 years, with a notable predominance of individuals presenting from the 31-45 years age cohort. This aligns with existing literature, which indicates that older adults are at a heightened risk for acute kidney injury (AKI) due to increased comorbidities, including diabetes mellitus and hypertension (10, 11). For instance, Ghuge reported that older age can be a significant risk factor for AKI, particularly in patients with gastrointestinal conditions (10).

In terms of gender distribution, our study showed a male predominance (62.2%), consistent with findings by Alabbas et al., who observed that male patients constituted a significant proportion of those admitted for acute gastroenteritis-related AKI (12). This pattern of healthcare-seeking behavior in males is reflected in several studies, in which men often present more frequently to tertiary care facilities than women (13, 14).

When analyzing the clinical profile, we found that a majority of patients (54.4%) experienced symptoms lasting ≤3 Days. While our results indicated that moderate dehydration was the predominant clinical presentation, the prevalence of mild to moderate dehydration is also reported by Baggett et al., who emphasized the critical role dehydration plays in gastroenteritis-associated AKI, particularly in understudied populations (15). The significance of hydration status is reflected in findings in pediatric settings, where severe dehydration markedly increases the likelihood of AKI (14).

Among our patients, 27 individuals met the criteria for AKI, resulting in an overall incidence of 15%. This figure is comparable to that reported by Yazıcı et al., who identified a higher prevalence of sepsis-associated AKI in their ICU cohort, highlighting variability in AKI prevalence across different conditions (11). However, our findings are consistent with other gastrointestinal studies on AKI prevalence, suggesting that a considerable impact persists for both gastroenteritis and hydration status (10).

When performing stratified analyses (Table 4), we observed statistically significant associations between age, diabetes mellitus, symptom duration, and dehydration severity and AKI. Higher frequencies of AKI were observed in the older age groups (46-60 years) and those with diabetes ($p = 0.009$). These findings corroborate literature indicating a strong connection between AKI and diabetes mellitus, as discussed by Myers et al., who noted the increased risk of AKI in diabetic patients (16). The p-value results reaffirm the importance of these variables in early identification and risk evaluation of AKI among patients presenting with acute gastroenteritis.

Moreover, our observation that patients with severe dehydration exhibited a significant association with AKI ($p < 0.001$) is crucial, as it underscores the critical role of fluid management in mitigating the risk of renal impairment (10). This association is supported by evidence from Pandiyan et al., who emphasized the importance of hydration in patients with acute diarrheal illnesses to prevent the progression to AKI (17).

It is worth noting that while gender did not show a significant association with AKI ($p = 0.298$), this contrasts with findings in other demographics where males were more susceptible to developing AKI in similar settings, as reported by Alabbas et al. (12). This discrepancy may be attributed to varying sociodemographic factors influencing healthcare access and presentation, highlighting that contextual factors should be considered in future research.

In conclusion, our findings highlight that acute gastroenteritis in the studied population is closely associated with the risk of AKI, particularly among middle-aged individuals with concomitant diabetes and severe dehydration. The results underscore the need for rapid assessment and management strategies within the healthcare framework to reduce the incidence of AKI and improve clinical outcomes.

Conclusion

Acute kidney injury was observed in a considerable proportion of patients presenting with acute gastroenteritis in this tertiary care setting. The risk of kidney injury increased significantly with advancing age, presence of diabetes mellitus, prolonged duration of symptoms, and severe dehydration at presentation. These findings emphasize the importance of early assessment of renal function and aggressive management of dehydration in patients with acute gastroenteritis. Timely intervention may reduce renal complications, hospital stay, and long-term morbidity, particularly in resource-limited healthcare settings like Pakistan.

Declarations

Data Availability statement
All data generated or analysed during the study are included in the manuscript.
Ethics approval and consent to participate
Approved by the department concerned. (IRBEC-24)
Consent for publication
Approved
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Not applicable

Conflict of interest

The authors declared no conflict of interest.

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All authors reviewed the results and approved the final version of the manuscript. They are also accountable for the study's integrity.

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