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Original Research Article

A Hospital-Based Study Assesses Clinical Profile of Patients with Acute Kidney Injury Following Acute Gastroenteritis: A Retrospective Study

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Abstract

Aim: The aim of the present study was to assess the clinical profile of patients with acute kidney injury following acute gastroenteritis.

Methods: The Present study was conducted in the Department of Medicine, Government medical College and Hospital, Madhepura, Bihar, India from August 2021 to July 2022. After applying inclusion and exclusion criteria, total 100 patients of AGE with AKI were considered for this study.

Results: Most common age group in this study was age group of 61–70 years (30%), followed by age group of 51–60 years (23%). Mean age of study patients was 54.6 ± 12.8 years. Male patients (65%) were more than female patients (35%). According to clinical presentation most common symptom was loose stools (100%), followed by fever (78%) and vomiting (70%). Other complaints were shortness of breath (20%) and altered sensorium (16%). AKI was staged for severity according to the KDIGO criteria. At the time of diagnosis most patients were in stage 1 (58%), while 31% and 11% were in stage 2 and 3 respectively.

Conclusion: Acute kidney injury in patients with acute gastroenteritis had good prognosis if detected earlier. Early recognition of AKI is essential to ensure prompt and appropriate management, and to avoid progression to deadlier stages of the disease.

Keywords: Acute Gastroenteritis, Acute Kidney Injury, KDIGO criteria

Introduction

Acute gastroenteritis (AGE) is characterized by rapid onset of diarrhea, which may be accompanied by vomiting, nausea, or fever, that usually lasts less than 14 days. [1] In the United States (US) alone, approximately 179 million episodes of AGE occur each year, resulting in approximately 600 000 hospitalizations and 5000 deaths. [2] Clinically, gastroenteritis can manifest as mild, moderate, or severe disease with the main symptoms of abdominal pain, diarrhea, nausea, and vomiting. A severe form of AGE includes bloody stools, fever, and sepsis. [3–5] AGE is usually diagnosed clinically based on the clinical history, physical examination, and evaluation of risk factors. The diagnosis can be supported based on the results of a complete blood count (CBC), basic metabolic panel, stool analysis and culture, and serum electrolyte levels. [6,7]

Most AGE cases are caused by viruses. Bacterial AGE accounts for approximately 20% of cases. Viral gastroenteritis usually affects children aged <2 years, whereas bacterial gastroenteritis occurs more often in those who are older than 2 years. However, diarrhea that lasts for at least 14 days is most frequently caused by parasitic infections. [8,9] Rotavirus is the most common cause of severe AGE in children and is responsible for an estimated 527 000 deaths in children younger than 5 years of age. [10] Although AGE usually remits spontaneously and only requires minimal medical intervention, severe complications, such as dehydration, may result in prolonged vomiting and diarrhea.

Dehydration occurs when the body loses a lot of water, electrolytes as well as other fluids; thus, an increase in serum osmolality of greater than 294 mOsm/kg is considered dehydration. [11] Dehydration is classified into three stages: mild, moderate, and severe. The assessment of the severity of dehydration in children is as follows: mild, 3–5% of dehydration; moderate, 6–9% of dehydration; and severe, more than 10% of dehydration. The percentage of dehydration is determined through

physical findings and vital signs. [12] In adults, mild dehydration is defined as a water loss equal to 1% of the body weight, which may result in headache, weakness, dizziness, and lethargy. Moderate dehydration can result in a dry mouth, low urinary output, tachycardia, and loss of skin elasticity. The body cannot regulate its temperature and blood pressure in case of severe dehydration. Patients with mild-to-moderate dehydration should receive oral rehydration therapy as first-line treatment. [13,14]

The aim of the present study was to assess the clinical profile of patients with acute kidney injury following acute gastroenteritis.

Materials and Methods

The Present study was conducted in the Department of Medicine, Government medical College and Hospital, Madhepura, Bihar, India from August 2021 to July 2022.. After applying inclusion and exclusion criteria, total 100 patients of AGE with AKI were considered for this study.

Inclusion Criteria

- Patients above 18 years, admitted with acute gastroenteritis.
- Patients with acute kidney injury (AKI), diagnosed by KDIGO criteria

Exclusion Criteria

- Age less than 18 years
- Patients with chronic renal insufficiency
- Patients who are initially considered as AKI but subsequently found to be suffering from long-standing renal disease.

An informed consent was taken from patients for participation. Demographic and clinical details, thorough examination findings were noted. Renal function tests with electrolytes are done daily and recorded. Other laboratory parameters such as CBC, ESR, Urine examination, Stool Examination, HIV, blood glucose, liver function test are also done. ABG, ECG, abdominal ultrasound examination were done whenever required. AKI was diagnosed according to Acute Kidney Injury Working Group of KDIGO (Kidney Disease: Improving Global Outcomes)2 which diagnoses AKI by an absolute increase in Serum Creatinine, at least 0.3 mg/dL within 48 hours or by a 50% increase in Serum Creatinine from baseline within 7 days, or a urine volume of less than 0.5 mL/kg/h for at least 6 hours. Primary treatment was done with adequate fluid replacement and antibiotics (gram negative spectrum for ongoing gastroenteritis). Dialysis was done in patients with hyperkalemia, pulmonary edema and severe metabolic acidosis, who did not respond to medical treatment and prophylactically in patients whose creatinine is more than 4 mg/dl. Data recorded include patients' characteristics, comorbid medical conditions, dialysis requirement, total duration of hospital stay, and complications that occurred in their hospital stay were recorded. and final outcome. The clinical and laboratory parameters were analyzed to assess the role of each of these factors as the possible outcome i.e. recovery or death. All patients were followed up till discharge or death. Statistical analysis was done using descriptive statistics. Results were expressed as mean and standard deviation for continuous data and frequency as number and percentage.

Results

Table 1: Age distribution

Age groups in years	Male	Female	Total
19–30	2	2	4 (4%)
31–40	4	5	9 (9%)
41–50	12	8	20 (20%)
51–60	15	8	23 (23%)
61–70	22	8	30 (30%)
71–80	8	3	11 (13%)
>80	2	1	3 (3%)
Total	65	35	100

Most common age group in this study was age group of 61–70 years (30%), followed by age group of 51–60 years (23%). Mean age of study patients was 54.6 ± 12.8 years. Male patients (65%) were more than female patients (35%).

Table 2: Symptom wise distribution

Symptoms	**N**	**%**
Loose stools	100	100
Fever	78	78
Vomiting	70	70
Shortness of breath	20	20
Altered sensorium	16	16

According to clinical presentation most common symptom was loose stools (100%), followed by fever (78%) and vomiting (70%). Other complaints were shortness of breath (20%) and altered sensorium (16%).

Table 3: AKI staging (KDIGO)

Stage	Serum creatinine	Urine output	No. of patients (%)
1	1.5–1.9 times baseline OR ≥0.3 mg/dl (≥26.5 μmol/l) increase	<0.5 ml/kg/h for 6–12 hours	58 (58%)
2	2.0–2.9 times baseline	<0.5 ml/kg/h for ≥12 hours	31 (31%)
3	3.0 times baseline OR	<0.3 ml/kg/h for ≥24 hours	
	Increase in serum creatinine to ≥4.0 mg/dl (≥353.6 μmol/l) OR	OR	
	Initiation of renal replacement therapy OR	Anuria for ≥12 hours	
	In patients <18 years, decrease in eGFR to <35 ml/min per 1.73 m2		11 (11%)

AKI was staged for severity according to the KDIGO criteria. At the time of diagnosis most patients were in stage 1 (58%), while 31% and 11% were in stage 2 and 3 respectively.

Discussion

Acute kidney injury (AKI) previously known as Acute Renal Failure, is a clinical syndrome characterized by an abrupt decline in glomerular filtration rate sufficient to decrease the elimination of nitrogenous waste products (urea and creatinine) and other uremic toxins. [15] The causes of AKI have traditionally been divided into three broad categories as prerenal (due to renal hypoperfusion), intrinsic (due to renal parenchymal pathology), postrenal (due to urinary tract obstruction). [16]

Most common age group in this study was age group of 61–70 years (30%), followed by age group of 51–60 years (23%). Mean age of study patients was 54.6 ± 12.8 years. Male patients (65%) were more than female patients (35%). Early in the course of AKI, optimization of the hemodynamic status and correction of any volume deficit will have a salutary effect on kidney function. Diuretics do not have any significant effect on progression or outcome of AKI. [17] In that study, mean age of presentation 46.5 ± 11.35years, in males was 47.3 ±11.35 and that of females was 45.72 ± 10.23 years. 63.33 % were Males and 36.7% were females. Similar findings were noted in present study. Acute kidney injury (AKI) is not an individual disease entity, but rather, is a syndrome that is characterized by a group of symptoms that occur together. AKI is a consequence of several underlying conditions; 20% of hospitalized patients have AKI, and 10% of these patients require renal replacement therapy. [18,19] According to the latest Kidney Disease Improving Global Outcomes (KDIGO) clinical guideline for the classification and management of AKI, an increase in serum creatinine (SCr) by ≥0.3 mg/dL within 48 hours and to ≥1.5 times the baseline level over 7 days or decreased urinary output <0.5 mL/kg/h for 6–12 hours indicates AKI. [20]

According to clinical presentation most common symptom was loose stools (100%), followed by fever (78%) and vomiting (70%). Other complaints were shortness of breath (20%) and altered sensorium (16%). AKI was staged for severity according to the KDIGO criteria. At the time of diagnosis most patients were in stage 1 (58%), while 31% and 11% were in stage 2 and 3 respectively. In the study by Satri V et al [21] sepsis was found to be the most common cause of AKI followed by acute gastroenteritis, while Eswarappa M et al [22] noted acute gastroenteritis as most common cause of AKI in their study. On stool culture and sensitivity, we found 88.5% patients with sterile stool cultures. 10.3% patients had E. coli on culture while 1 patient has Salmonella growth on stool culture.

Inbanathan J et al [23] noted that 70 % patients were treated conservatively and 30 % required hemodialysis. 52% were discharged within 1 week, while 37% of patients were discharged between 1-3 weeks. 11% of patients were treated for more than 3 weeks. 4% mortality was noted. The prognosis of patients with AKI is directly related to cause of renal failure and, to great extent, to the duration of renal failure before therapeutic intervention. Prognostic factors are older age, multiorgan failure (i.e., the more the organ that fails, the worser is prognosis), circulatory failure, vasopressor support, and need for renal replacement therapy (RRT). Factors influencing patient survival in acute kidney injury are severity of injury and underlying disease and other factors such as age, severity of coexistent illnesses and associated complications like Intravascular overload, hyperkalemia and other metabolic complications and systemic life-threatening complications like cardiac arrhythmia, myocardial infarction, pulmonary embolism,

gastrointestinal ulcers, seizures, coma, hemolysis, bleeding tendencies and severe infections. [24]

In the appropriate context, early detection requires a high degree of suspicion that AKI is occurring. Diagnosis requires a combination of a clinical history, a thorough physical examination, an accurate assessment of kidney function, appropriate imaging, and when indicated, a kidney biopsy.

Conclusion

Acute kidney injury in patients with acute gastroenteritis had good prognosis if detected earlier. Early recognition of AKI is essential to ensure prompt and appropriate management, and to avoid progression to deadlier stages of the disease.

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