

A prospective study of clinical profile of patients with acute kidney injury following acute gastroenteritis

Dnyaneshwar Malharrao Ghuge^{1*}, Balasaheb Eknathrao Karad²

¹Associate Professor, ²Professor, Department of Medicine, Pacific Institute of Medical Sciences, Udaipur, Rajasthan, INDIA.

Email: drdmghuge@yahoo.com, karadbalasaheb@gmail.com

Abstract

Background: Increasing number of patients of AGE are now diagnosed with AKI. Over the recent years there has been increasing recognition that relatively small rises in serum creatinine in a variety of clinical settings are associated with worse outcomes. In present study, we aimed to study clinical profile of patients with acute kidney injury following acute gastroenteritis at our tertiary hospital. **Material and Methods:** Present study was conducted in patients who were diagnosed to have AKI following acute gastroenteritis. 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:** After applying inclusion and exclusion criteria, total 72 patients of AGE with AKI were considered for this study. Most common age group in this study was age group of 61–70 years (28%), followed by age group of 51–60 years (25%). Mean age of study patients was 53.8 ± 11.7 years. Male patients (64%) were more than female patients (36%). Male to female ratio was 1.8:1. According to clinical presentation most common symptom was loose stools (100 %), followed by fever (76 %) and vomiting (68 %). Other complaints were shortness of breath (18 %) and altered sensorium (8 %). Diabetes was the most common co-morbidity noted (39 %) followed by hypertension (34%). AKI was staged for severity according to the KDIGO criteria. At the time of diagnosis most patients were in stage 1 (57%), while 32% and 11% were in stage 2 and 3 respectively. In this study hypotension, hyperkalemia were common complications of Acute Kidney Injury. Other complications were metabolic acidosis, encephalopathy, pulmonary edema, anemia, multi organ dysfunction syndrome (MODS), hypokalemia and hyponatremia. In present study, 11% patients underwent hemodialysis and 3 % mortality was noted. **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

*Address for Correspondence:

Dr Dnyaneshwar Malharrao Ghuge, Associate Professor, Department of Medicine, Pacific Institute of Medical Sciences, Udaipur, Rajasthan, INDIA.

Email: karadbalasaheb@gmail.com

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INTRODUCTION

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.¹ 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).² Common causes for AKI are acute volume depletion (diarrheal diseases, haemorrhage), sepsis, infection (malaria, pneumonia, viral hepatitis), snake bite, acute cardiac failure, nephrotoxic

drug use, malignancy, SLE, hypertension, major surgeries, radio contrast agents. etc.³ Severe acute gastroenteritis (AGE) may lead to acute fluid loss followed by oliguria, azotemia, and hyperkalemia (due to supervening catabolic state and lactic acidosis) renal hypoperfusion and AKI. This may progress to renal shutdown with oligoanuria and its functional consequences with or without significant structural damage. Increasing number of patients of AGE are now diagnosed with AKI. Over the recent years there has been increasing recognition that relatively small rises in serum creatinine in a variety of clinical settings are associated with worse outcomes.⁴ In present study, we aimed to study clinical profile of patients with acute kidney injury following acute gastroenteritis at our tertiary hospital.

MATERIAL AND METHODS

Present study was conducted in patients who were diagnosed to have AKI following acute gastroenteritis. Study was prospective, observational type. Study was conducted in Department of General Medicine, Pacific Institute of Medical Sciences, Udaipur, between October 2018 to October 2019. Permission to conduct present study was granted by ethical committee.

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

After applying inclusion and exclusion criteria, total 72 patients of AGE with AKI were considered for this study. Most common age group in this study was age group of 61–70 years (28%), followed by age group of 51–60 years (25%). Mean age of study patients was 53.8 ± 11.7 years. Male patients (64%) were more than female patients (36%). Male to female ratio was 1.8:1.

Table 1: Age distribution

Age groups (years)	Male	Female	Total
19–30	1 (1%)	1 (1%)	2 (3%)
31–40	3 (4%)	4 (6%)	7 (10%)
41–50	8 (11%)	5 (7%)	13 (18%)
51–60	12 (17%)	6 (8%)	18 (25%)
61–70	13 (18%)	7 (10%)	20 (28%)
71–80	7 (10%)	2 (3%)	9 (13%)
>80	2 (3%)	1 (1%)	3 (4%)
Total	46 (64%)	26 (36%)	72

According to clinical presentation most common symptom was loose stools (100 %), followed by fever (76 %) and vomiting (68 %). Other complaints were shortness of breath (18 %) and altered sensorium (8 %). Diabetes was the most common co-morbidity noted (39 %) followed by hypertension (34%).

Table 2: Symptom wise distribution

Number of cases	Number of patients	Percentages
Loose stools	72	100%
Fever	55	76%
Vomiting	49	68%
Shortness of breath	13	18%
Altered sensorium	11	15%

AKI was staged for severity according to the KDIGO criteria². At the time of diagnosis most patients were in stage 1 (57%), while 32% and 11% were in stage 2 and 3 respectively.

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	41 (57%)
2	2.0–2.9 times baseline	<0.5 ml/kg/h for ≥12 hours	23 (32%)
3	3.0 times baseline OR Increase in serum creatinine to ≥4.0 mg/dl (≥353.6 μmol/l) OR Initiation of renal replacement therapy OR In patients <18 years, decrease in eGFR to <35 ml/min per 1.73 m ²	<0.3 ml/kg/h for ≥24 hours OR Anuria for ≥12 hours	8 (11%)

In this study hypotension, hyperkalemia were common complications of Acute Kidney Injury. Other complications were metabolic acidosis, encephalopathy, pulmonary edema, anemia, multi organ dysfunction syndrome (MODS), hypokalemia and hyponatremia. In present study, 11% patients underwent hemodialysis and 3 % mortality was noted.

DISCUSSION

In developing countries AGE still remains one of the common causes of communicable disease that lead to AKI.⁵ Non-availability of clean drinking water, adulteration of food and beverages, poor sanitation, lack of public awareness about personal hygiene are common causes of AGE in developing countries. Most patients with mild to moderate acute kidney injury are asymptomatic and are identified on laboratory testing. Patients with severe cases of acute kidney injury, however, may be symptomatic and present with listlessness, confusion, fatigue, anorexia, nausea, vomiting, weight gain, or edema.⁶ Lewington AJ noted that the pooled incidence rates of AKI in adult was 21.6–20% of hospitalized adult patients experienced AKI during a hospital care which is associated with high expenditure of resources and lead to adverse outcomes.⁷ AKI with a rise in serum creatinine as modest as 0.3 mg/dL is associated with a 70% increase in mortality risk and increased risk of death by 6.5 times.⁸ 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.⁹ In a similar study, mean age of presentation 46.5 ± 11.35 years, 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. In the study by Satri V *et al.* sepsis was found to be the most common cause of AKI followed by acute gastroenteritis, while Eswarappa M *et al.* 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.¹³ Similar findings were noted in present study. Pajai AE *et al.*,¹⁴ noted that vasopressor support was required in 18.9% patients, 7.5% required transfusion of blood and blood products, 11.3% required CPAP support and 2 patients needed mechanical ventilation. 50.9% recovered within 7 days of treatment initiation and 45.3% required more than 7 days for recovery. 32.1%

required renal replacement therapy and 3.8% mortality was noted. Analysis revealed delay in initiation of definitive therapy lead to increased requirement of supportive therapy in form of Vasopressor support, renal replacement therapy and it was statistically significant.¹⁵ Inbanathan J *et al.*,¹⁵ 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 worse 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.¹⁶ Regardless of cause, the management of AKI is mainly supportive, with dialysis being indicated when medical management fails to treat the complications. The duration and severity of AKI is a risk factor for the development of complications such as a 10-fold increase in the risk of chronic kidney disease and a 3-fold risk of end-stage renal disease.^{17,18} Failure to detect and treat timely and/or adequately usually leads to significant untoward consequences. It is associated with a high morbidity and permanent loss of kidney function.¹⁹ 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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