

Original Research Article

Risk factors and clinical profile in patients of acute kidney injury

Ajay Kumar, Rupinderjeet Kaur, Lovleen Bhatia, Ardaman Singh, Richa Bansal*

Department of Medicine, Government Medical College, Patiala, Punjab, India

Received: 29 May 2023

Revised: 18 July 2023

Accepted: 16 August 2023

***Correspondence:**

Dr. Richa Bansal,

E-mail: drbansalmed@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Acute kidney injury (AKI) is an outcome of multiple etiologies and is mostly reversible. This hospital based cross-sectional observational study was aimed to study the risk factors and clinical profile in patients of AKI.

Methods: Sixty AKI patients diagnosed by acute kidney injury network criteria as suggested by kidney disease improving global outcomes clinical practice guidelines were enrolled. Patients with preexisting chronic kidney disease were excluded. Relevant data was recorded and analyzed statistically. Data were compiled using the Statistical Package for the Social Sciences version 17. Regression analysis was done for determining the association of various variables for mortality. $P < 0.05$ was considered statistically significant.

Results: The mean age of patients was 52.63 ± 15.58 years with male:female ratio of 2:1. 20% of cases had co-morbidities, the most common co-morbidity being diabetes mellitus with hypertension in 15% of cases. The most common presenting symptom was vomiting (63.3% of patients); sign was hypotension and tachycardia (46.7% each). sepsis was the most common cause of AKI affecting 38 (63.33%) cases. Majority of the cases were non oliguric 81.7%. Pre-renal variety was found in 41.7% patients in this area. Hence, this study suggested a scope for reducing morbidity and mortality associated with AKI if these preventable factors leading to Pre-Renal AKI and sepsis, being an important risk factor for AKI are controlled and prevented as far as possible.

Conclusions: The study concluded that sepsis was the most common cause of AKI.

Keywords: Acute kidney injury, Hypotension, Sepsis

INTRODUCTION

Acute kidney injury (AKI) is defined by the impairment of kidney filtration and excretory function over days to weeks, resulting in the retention of nitrogenous and other waste products normally cleared by the kidneys. The magnitude of the problem is so alarming that 1 in 5 adults and 1 in 3 children experience AKI worldwide during a hospital episode of care.¹ The causes of AKI are divided into three groups: pre-renal, intra renal and post renal. AKI can range in severity from asymptomatic with transient changes in laboratory parameters of glomerular filtration rate to rapidly fatal derangements in effective circulating volume, electrolyte, and acid base compositions of the plasma. Many unfavourable

outcomes of AKI as increased length of hospital stay, progression to chronic kidney disease (CKD) and mortality is consistently shown in multiple patient populations.²⁻⁷ Reversing the underlying cause and correcting fluid as well as electrolyte imbalance are the key management modalities of AKI.⁸ The vast geographical and socioeconomic diversity in India leads to the regional differences in the epidemiology as well as outcomes of AKI. Owing to these facts and the single-center, retrospective designs of the existing studies limit the generalization of their results.

Our objective was to study risk factors and clinical profile in patients of acute kidney injury.

METHODS

The ethical clearance from the institutional ethical committee was obtained. Then patients admitted in department of medicine, Government Medical College and Hospital were enrolled for study after taking written informed consent.

This was a hospital based cross-sectional observational study was conducted from May 2020 to August 2021. acute kidney injury was diagnosed as per acute kidney injury network criteria suggested by kidney disease improving global outcomes clinical practice guidelines, relevant data was recorded and analyzed statistically.⁵

Inclusion criteria

Patients above the age of 20 years who were diagnosed as having AKI as per the following criteria were admitted to the study: increase in serum creatinine by at least 0.3 mg/dl (26.5 μmol/l) within 48 hours; or increase in serum creatinine of at least 1.5 times baseline, which is known or presumed to have occurred within the prior 7 days; or urine volume <0.5 ml/kg/hours for 6 hours.⁵

Exclusion criteria

Pregnant female patients with pre-existing chronic kidney disease or age below 20 years, and those who did not consent for study were excluded.

In all eligible patients, a thorough history was taken followed by clinical examination, laboratory investigations including complete blood counts, urine analysis, blood urea, serum creatinine, electrolytes, blood glucose, liver function tests, chest x-rays, and ultrasonography of KUB were done. Additional investigations as ultrasonography of abdomen were done as and when required. All the results of each patient were recorded in a structured proforma. All patients were put on an indwelling Foley's catheter, and urine output was measured through the same. Oliguria was defined as the less than 400 ml per day of urine output. Sepsis was diagnosed using the qSOFA score.⁹ qSOFA score has 3 components that is respiratory rate >22/minutes (carries 1 point), altered sensorium (carries 1 point) and systolic blood pressure <100 mmHg (carries 1 point). qSOFA score >3 is suggestive of sepsis.

Statistical analysis

Descriptive statistics was done for all data and were reported in terms of mean, SD and percentages. Normality of the data is checked with the help of Kolmogorov Smirnov Test. Categorical variables were analyzed with the help of chi square test and Fisher Exact Test. p<0.05 was considered to be statistically significant. The data was analyzed using SPSS version 22 (trial version) and Microsoft Excel.

RESULTS

Total sixty patients with AKI were studied. The mean patient age was 52.63±15.58 years (range 20 to 80; Figure 1) and median age of 54 years. 40 (66.7%) were males and 20 (33.3%) were females with a male female ratio 2:1 (Table 1). Diabetes mellitus (DM) was the most common co-morbidity present in 7 (11.7%) of cases followed by hypertension (HTN) in 5 (8.3%) cases; out of these patients 4 had both DM and HTN. Vomiting was the most common presenting symptom in 63.3% of patients followed by diarrhea and fever (58.3% each), oliguria (18.3%) and pain abdomen (5%). On clinical examination, tachycardia and hypotension was present in 46.7% of cases.

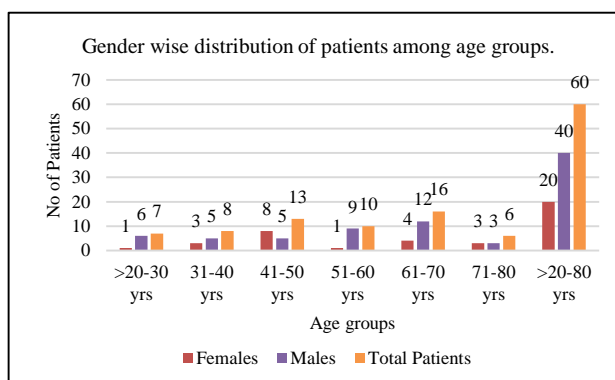


Figure 1: Gender wise distribution of patients among age groups.

Table 1: Gender wise distribution.

Gender	Number	Percentage
Male	40	66.7
Female	20	33.3
Total	60	100.0
Chi square	6.667	
P value	0.010	
Significance	S	

Among the clinical condition leading to AKI, sepsis was the most common, found in 72% of cases, followed by hypotension in 46.7% of cases. Concomitant diabetes with hypertension was associated with stage 3 AKI, in 4 cases (15%). 81.7% of patients with AKI were non oliguric whereas 18.3% of patients were oliguric.

Table 2: Distribution of subjects according to BUN/serum creatinine ratio.

BUN/SC ratio	Number	Percentage
≤20	35	58.3
>20	25	41.7
Total	60	100.0
Chi square	1.667	
P value	0.197	
Significance	NS	

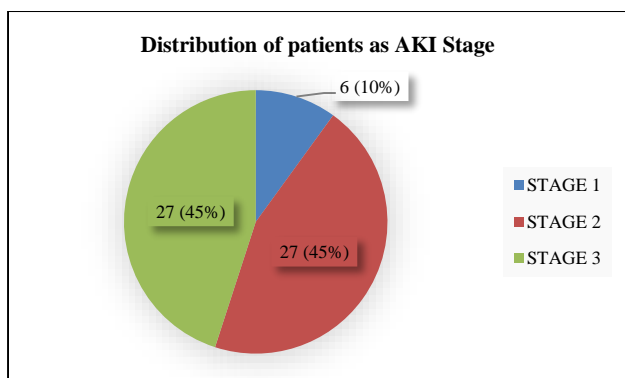


Figure 2: Distribution of patients as AKI stage.

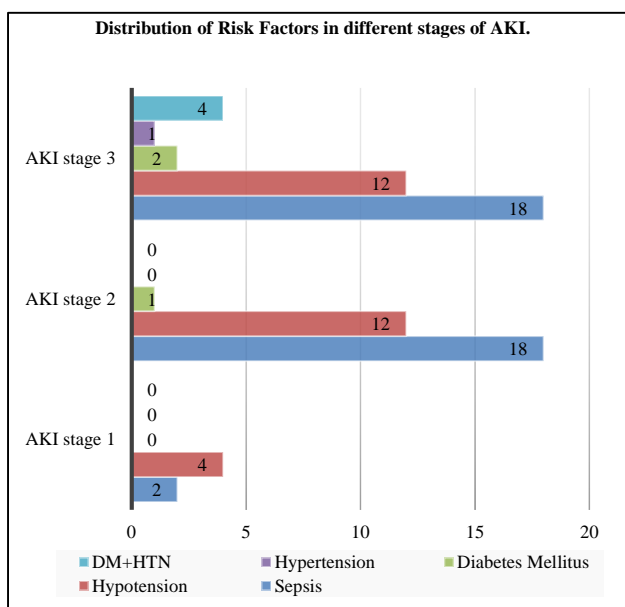


Figure 3: Distribution of risk factors in different stages of AKI.

DISCUSSION

We had observed that majority (45%) of patients were in the age group of 40 to 60 years, which is comparable to study done by Pillai et al having 45.7% of patients in 40-60 years age group.¹⁰ Vomiting was the most common presenting symptom in 63.3% of patients followed by diarrhoea and fever (58.3% each), oliguria (18.3%) and pain abdomen (5%). Hypotension and tachycardia (46.7%) were the most common finding on clinical examination. Vomiting being a feature of uremia was the most common symptom at presentation. Khan et al conducted a study in which vomiting was observed as the most common presenting symptom found in 92% of the patients and hypotension most common finding on clinical examination in 30% cases.⁸ Mahbub et al conducted a study in which fever was present in 52% cases which is comparable to our study.¹

Sepsis was found to be the most common cause of AKI affecting 38 (63.33%) cases, which is also statistically

significant. Hafeez et al as well as Pillai et al in their studies also found sepsis to be the most common cause in 36% and 27% of cases respectively.^{10,11} For patients with presumed sepsis, early empiric broad-spectrum antibiotic therapy should be initiated within 1 hour of presentation. Multiple studies showed that the prompt administration of antibiotics was associated with improved survival.^{12,13} The selection of appropriate empiric antibiotic therapy is essential for decreasing mortality in septic patients and should be guided by clinical presentation and local antimicrobial resistance patterns, as well as the patient's risk factors for particular organisms.¹³

In our study, 25 (41.7%) patients of pre-renal AKI (BUN/S Cr ratio of >20); which is comparable to the study conducted by Uchino et al having approximately 50% of hospitalized patients with pre-renal AKI (BUN/S Cr ratio of >20).¹⁴ The most common factors associated with pre-renal AKI in our study are- vomiting in 80% (p value 0.003) of cases, diarrhea in 72% (p value 0.028) of cases and hypotension in 60% (p value 0.317) of cases, in this area. These are the preventable and easily manageable factors. Timely management of these associated risk factors can decrease the incidence of AKI. In the emergency department or the hospital setting, the mainstay of treatment of pre renal AKI is isotonic fluid administration. It is both therapeutic and diagnostic. A decrease in creatinine after administration of isotonic fluids is the gold standard in diagnosis. The degree of volume resuscitation depends on the degree of volume depletion caused by the underlying condition.

CONCLUSION

Sepsis was identified as the most common associated factor and probable etiology of AKI. Vomiting was found as the most frequent clinical presentation in the present study. Hypotension and diarrhea were common factors associated with AKI, though not statistically significant. However, when analyzed for pre-renal AKI, they are prominent association after vomiting. Pre-renal variety was found in 41.7% patients in this area. Hence, this study suggested a scope for reducing morbidity and mortality associated with AKI if these preventable factors leading to pre-renal AKI and sepsis, being an important risk factor for AKI are controlled and prevented as far as possible.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Mahbub T, Niger CR, Khanam RA, Faruq MO. Etiology and short-term outcome of acute kidney injury (AKI) in hospitalized patients: a single center study. Bangladesh Crit Care J. 2019;7(2):77-80.

2. Uchino S, Kellum JA, Bellomo R, Doig GS, Morimatsu H, Morgera S, et al. Acute renal failure in critically ill patients: a multinational, multicenter study. *JAMA.* 2005;294(7):813-8.
3. Liano F, Pascual J. Epidemiology of acute renal failure: a prospective, multicenter, community-based study. Madrid Acute Renal Failure Study Group. *Kidney Int.* 1996;50(3):811-8.
4. Ali T, Khan I, Simpson W, Prescott G, Townend J, Smith W, et al. Incidence and outcomes in acute kidney injury: a comprehensive population-based study. *J Am Soc Nephrol.* 2007;18(4):1292-8.
5. Kellum JA, Lameire N, Aspelin P, Barsoum RS, Burdmann EA, Goldstein SL, et al. Kidney disease: improving global outcomes (KDIGO) acute kidney injury work group. KDIGO clinical practice guideline for acute kidney injury. *Kidney Int.* 2012;2:1-138.
6. Kaddourah A, Basu RK, Bagshaw SM, Goldstein SL, Investigators A. Epidemiology of acute kidney injury in critically ill children and young adults. *N Engl J Med.* 2017;376(1):11-20.
7. Sutherland SM, Byrnes JJ, Kothari M, Longhurst CA, Dutta S, Garcia P, et al. AKI in hospitalized children: comparing the pRIFLE, AKIN, and KDIGO definitions. *Clin J Am Soc Nephrol.* 2015;10(4):554-61.
8. Khan MY, Deepak P, Kumar AP, Kumar KTV. Study of etiology, clinical profile and outcome of acute kidney injury (AKI) in medical intensive care unit. *Int J Contemp Med Res.* 2017;4(11):2225-8.
9. Marik PE, Taeb AM. SIRS, qSOFA and new sepsis definition. *J Thorac Dis.* 2017;9(4):943.
10. Pillai VS, Verghese CJ, Pais CC, Rai VG, Chakrapani M. Clinical profile and outcomes of acute kidney injury patients in an intensive care unit in india: a retrospective study. *New Front Med Med Res.* 2021;1:158-65.
11. ElHafeez SA, Tripepi G, Quinn R, Naga Y, Abdelmonem S, AbdelHady M, et al. Risk, predictors, and outcomes of acute kidney injury in patients admitted to intensive care units in Egypt. *Scient Rep.* 2017;7(1):1-8.
12. Huang ST, Ke TY, Chuang YW, Lin CL, Kao CH. Renal complications and subsequent mortality in acute critically ill patients without pre-existing renal disease. *CMAJ.* 2018;190(36):E1070-80.
13. Levy MM, Evans LE, Rhodes A. The surviving sepsis campaign bundle: 2018 update. *Intens Care Med.* 2018;44(6):925-8.
14. Uchino S, Bellomo R, Goldsmith D. The meaning of the blood urea nitrogen/creatinine ratio in acute kidney injury. *Clin Kidney J.* 2012;5(2):187-91.

Cite this article as: Kumar A, Kaur R, Bhatia L, Singh A, Bansal R. Risk factors and clinical profile in patients of acute kidney injury. *Int J Res Med Sci* 2023;11:3353-6.