JGPEMN
ISSN 2091-279X
eISSN 2362-1168

ORIGINAL ARTICLE

Prevalence of patients with acute kidney injury presenting to Tribhuvan University Teaching Hospital

Tirtha Man Shrestha[1], Yagya Laxmi Shakya[2], Ram Prasad Neupane[3], Shankar Raut[4], Rajan Ghimire[5]

[1]Asst. Prof., [2]Assoc. Prof., Dept. of General Practice, [3]Asst. Prof., Dept. of Emergency Medicine, Tribhuvan University Teaching Hospital, Maharajgunj Medical Campus, Institute of Medicine, Tribhuvan University, Kathmandu, Nepal; [4]Medical Practitioner, Emergency Department, Lyell McEwin Hospital, NALHN Adelaide, Australia; [5]General Practice & Emergency Medicine, Consultant, Malekhu Teaching Hospital, Dhading, Nepal

Date of submission: 1 Oct 2024

Date of acceptance: 5 Nov 2024

Date of Publication: 15 Dec 2024

Correspondence:
Dr. Yagya Laxmi Shakya
Dept. of General Practice, Tribhuvan University Teaching Hospital
Maharajgunj Medical Campus, Institute of Medicine, Tribhuvan University,
Kathmandu, Nepal
Email: yagya70@yahoo.com

How to cite:
Shrestha TM, Shakya YL, Neupane RP, Raut S, Ghimire R. Prevalence of patients with acute kidney injury presenting to Tribhuvan University Teaching Hospital. J Gen Pract Emerg Med Nepal. 2024 Dec;11(18):43-47.

Online information
DOI:
https://doi.org/10.59284/jgpeman299

Abstract

Introduction: Acute kidney injury is one of the most important causes of morbidity and mortality in hospitalized patients. AKI's causes vary based on geographical regions, lifestyles, disease patterns, and management strategies. Thus, there might be differences in its prevalence in different parts of theworld. Therefore, the study aims to evaluate the prevalence and demographic distribution, underlying causes, intervention, and outcome of acute kidney injury patients presented in emergency rooms.

Method: This observational retrospective cross-sectional study was performed on patients with AKI who presented to the emergency room of Tribhuvan University of Teaching Hospital from 1 Sep 2019 to 31 Jan 2020. A structured data collection sheet was used to gather demographic, laboratory parameters, management, and outcome data.

Result: A total of 253 AKI patients were enrolled in the study. The mean±SD age was 59.28±19.34 years. 147 (58.1%) were Male, and 106(41.9%) were female. The most common type of AKI was renal 183(72.33%) followed by prerenal 38(15.02%), and post-renal 32(12.65%). The most common etiologic cause of renal failure was UTI 73(28.9%), followed by pneumonia 56(22.1%). Mean urea, creatinine, sodium, and potassium levels were 12.03 mmol/L, 184.15 µmol/L, 135 mEq/L and 4.17 mEq/L, respectively. Only four patients needed dialysis, and two patients expired during hospital stay.

Conclusion: The most typical cause of acute renal failure is renal causes, followed by pre-renal and post-renal. Infection remains the most preventable cause of AKI.

Keywords: Acute kidney Injury, Emergency room, Outcome, Prevalence

INTRODUCTION

Acute Kidney Injury(AKI) is defined as any of the following (Not Graded): An increase in serum creatinine by 0.3 mg/dl (26.5 mmol/l) within 48 hours or an increase in serum creatinine to 1.5 times baseline, which is known or presumed to have occurred within the prior 7 days; or urine volume less than 0.5 ml/kg/h for 6 hours.[1] AKI is a sudden decline in kidney function, leading to the retention of nitrogenous waste products and creatinine and the derangement of body fluid and electrolytes. AKI is one of the leading causes of mortality in inpatients and the elderly.[1–4] There is a variation in the causes of AKI depending on geography, and the prevalence is significantly different in developing and developed countries.[6] The commonly affected population is 60 – 79-year-old men, and common comorbidities in such patients include surgery, diabetes, pneumonia, cardiac failure, stroke, and a history of chronic kidney disease.[7]

Emergency departments are frequently the first site of care for patients with AKI and chronic kidney disease. Appropriate care and management of AKI patients can not only be organ-saving and prevent long-term complications like chronic kidney disease but also be lifesaving. Currently, the International Society of Nephrology (ISN) policy is focused on the elimination of preventable deaths due to AKI in low-income countries by 2025.[8]

Data on the epidemiological distribution of AKI cases is a must for the effective development of plans and policies for reducing preventable deaths from AKI. Most of the available data are from studies of the ICU or surgical patients.[9,10] Therefore, this study focuses on evaluating the prevalence of AKI patients arriving at emergency services.

METHOD

This cross-sectional retrospective study was conducted in the emergency services of Tribhuvan University Teaching Hospital, Maharajgunj, Kathmandu, Nepal. Data was collected from 1 Sep 2019 to 31 Jan 2020 (five months). All patients admitted to the emergency and observation ward diagnosed with acute kidney injury during the study period were included in the study. The attending doctor diagnosed AKI as per the RIFLE Criteria.[1]

Patients who had undergone kidney transplants, maintenance renal replacement therapy-hemodialysis, peritoneal dialysis, and pregnancy were excluded from the study. A structured data collection sheet was used to gather data. Demographic data (age and sex) and clinical data (primary diagnosis, presence of co-morbid conditions, laboratory parameters, need for renal replacement therapy, and outcomes) were collected. Data on kidney function included serum creatinine, urea, sodium, potassium, urine output, and hematological profile.

Data was analyzed using Microsoft Office Excel (2010) and the Statistical Package for the Social Sciences-20 version. Frequency and percentages were calculated for categorical variables, and mean and standard deviation were calculated for numerical variables.

Ethical clearance was taken from the Institutional Review Committee of IOM with reference number 357/(6-11) E^2/076/077.

RESULT

A total of 253 AKI patients were enrolled in the study. The mean±SD age was 59.28±19.34 years. Most of the participants are more than 70 years old (Figure 1); 147 (58.1%) were male, and 106(41.9%) were female. The most common type of AKI was renal 183(72.33%) followed by prerenal 38(15.02%) and post-renal 32(12.65%). The type of AKI was determined per clinical profile, laboratory, and radiological evaluation. The most common etiologic cause of renal failure was urinary tract infection (UTI) 73(28.9%), followed by pneumonia 56(22.1%) (Table 1). Mean urea, creatinine, sodium, and potassium levels were 12.03 mmol/L, 184.15 µmol/L, and 135 mEq/Land 4.17 mEq/L, respectively. Only four (1.6%) patients needed dialysis, and two expired.

Hypertension was the most common comorbid condition among AKI patients, followed by diabetes (Table 2). However, most of the patients were normotensive, followed by stage 1 hypertension during presentation in emergency services (Table 3).

Most of the patients had normal sodium and potassium levels (Table 4 and Table 5). 135(53%) of the participants had normal hemoglobin levels (Figure 2).

Table 1. RIFLE criteria

Class	Glomerular Filtration Rate	Urine output
Risk	↑ SCr × 1.5 or ↓ GFR >25%	<0.5 mL/kg/h × 6 h
Injury	↑ SCr × 2 or ↓ GFR >50%	<0.5 mL/kg/h × 12 h
Failure	↑ SCr × 3 or ↓ GFR >75% or if baseline SCr ≥353.6 µmol/L(≥4 mg/dL) ↑ SCr >44.2 µmol/L(>0.5 mg/dL)	<0.3 mL/kg/h × 24 h or anuria × 12 h
Loss of kidney function	Complete loss of kidney function >4 weeks	
End-stage kidney disease	Complete loss of kidney function >3 months	

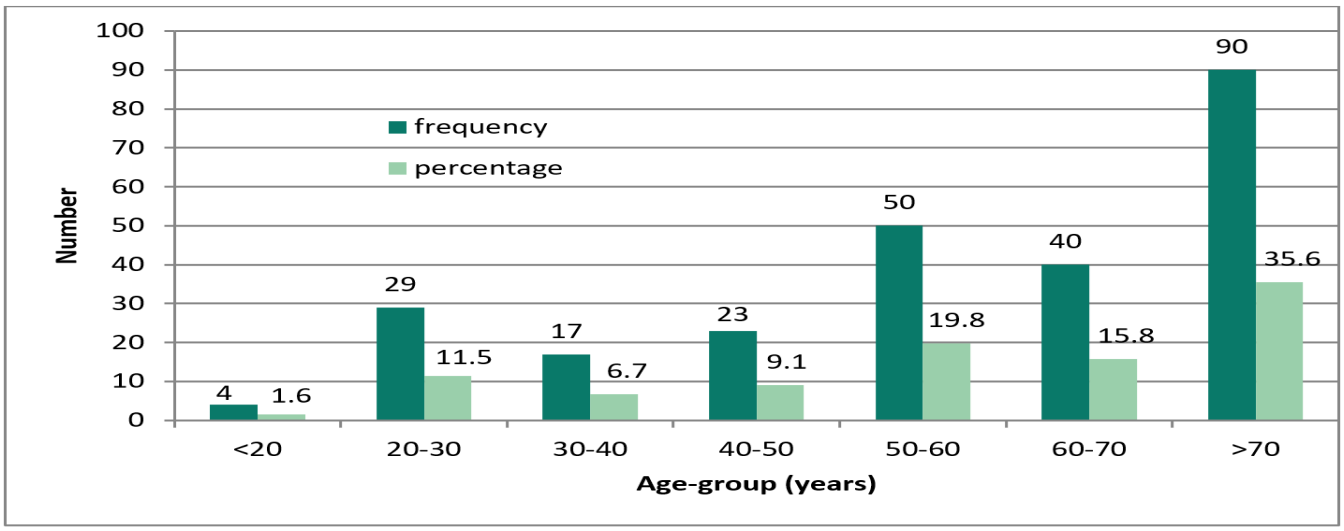

Figure 1. Age-wise distribution of the participants

Table 2. Causes of AKI (N=253)

Type of AKI	Causes	*f* (%)
Pre-renal	AGE	21(8.3%)
	Blood loss (hemorrhage)	15(5.9%
	Acute pancreatitis	02(0.8%)
Renal	UTI	73(28.9%)
	Pneumonia	56(22.1%)
	COPD	26(10.3%)
	Drugs	14(5.5%)
	Acute febrile illness	14(5.5%)
Post-renal	Obstructive Uropathy	18(7.1%)
	Nephrolithiasis	14(5.5 %)

Table 3. Comorbidities present in AKI patients

Comorbidities	*f* (%)
Hypertension	39(15.4%)
Renal calculus	3(1.2%)
Diabetes mellitus	18(7.1%)
Chronic obstructive pulmonary disease	12(4.7%)
Acute/Chronic liver disease	12(4.7%)
Valvular Heart Disease / Rheumatic Heart disease	5(2.0%)
Others	11(4.3%)
None	136(53.8%)
Hypertension and Diabetes	17(6.7%)

Table 4. Blood pressure of AKI patients during presentation

Blood Pressure	Systolic BP	*f* (%)	Diastolic BP	*f* (%)
Normal	<120	172(68%)	<80	199(79%)
Elevated BP	120-130	25(10%)		
Stage 1	130-140	27(11%)	80-89	30(12%)
Stage 2	140-180	23(9%)	90-120	24(9%)
Hypertension crisis	>180	6(2%)	>120	0(0%)

Table 5. Serum sodium level in patients with AKI

Serum sodium	level	(mmol/l)	*f* (%)
Hyponatremia	mild	130-134	41(16)
	moderate	125-129	17(7)
	profound	<125	16(6)
Normal		135-145	175(69)
Hypernatremia	mild	146-149	2(1)
	moderate	150-169	2(1)
	severe	>170mmol/l	0(0)

Table 6. Serum potassium levels in patients with AKI

Serum potassium	Level	(mmol/l)	*f* (%)
Hyperkalemia	mild	5.5-6.5	11(4.35%)
	moderate	6.5-7.5	1(0.4%)
	severe	>7.5	2(0.79%)
Normal potassium level		3.5-5.5	195(77.08%)
Hypokalemia	mild	3.0-3.5	40(15.81%)
	moderate	2.5-3.0	0(05)
	severe	<2.5	4(1.58%)

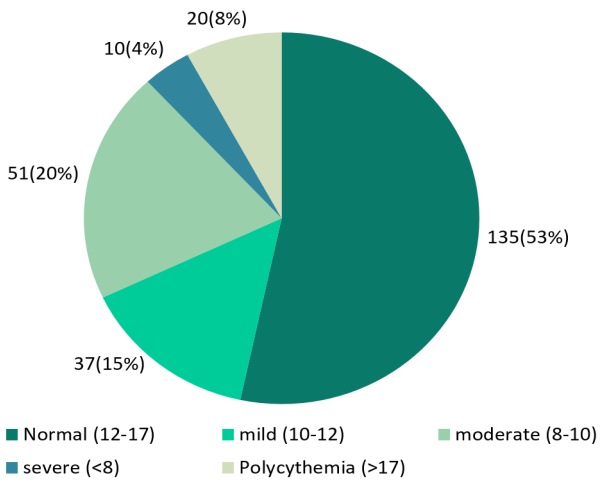

Figure 2. Hemoglobin level in patients with AKI

DISCUSSION

In our study, AKI was commonly found in people over 70, which was similar to the study by Safari S, et al.,[11] (62.72 years). However, it was much higher than the median age in the study by Reynolds T[12] and Sylvanus, et al.[13]

AKI was more prevalent in male 147(58.1%) compared to female 106(41.9%). The study was similar to the study by Sylvanus, et al.[13] and Safari S, et al.[11]

According to the study, the most common diagnosis causing AKI was UTI, which was 73(28.9%), followed by pneumonia, which was 56(22.1%). The study by Shrestha, et al.[14] showed sepsis as the most common diagnosis of AKI.

The most common type of AKI was renal 183(72.33%), and prerenal 38(15.02%), which was similar to the study by Patel, et al.[16] However, the study was not identical to the study by Safari S, et al.[11] and Osman, et al.[15]

Among AKI patients, the most common comorbid condition associated with AKI was hypertension 39(15.4%), which was similar to the study done by Safari S, et al.[11] Hypertension was followed by diabetes 18(7.1%) and both disease 17(6.7%). The study by Patel, et al.[16] also had similar findings with hypertension followed by diabetes as the most common comorbid condition in patients with AKI. However, 136(53.8%) patients with AKI had no comorbid conditions, which was almost double the study by Patel, et al.[16]

Of the total cases of AKI, 4(1.6%) underwent emergency dialysis, whereas, the rest received conservative management, which is not comparable with the study by Sylvanus, et al.[13] Among the dialyzed patients, the most common indication was severe metabolic acidosis.

This was a retrospective single-center study. There are chances of biases during sampling, and the outcome might be different if they were followed up for a certain period. The findings cannot be generalized as it is a single-center study. Prospective study designs, including multiple centers, can result in findings similar to the population's.

CONCLUSION

In the study done at emergency department of TUTH, AKI is one of the most prevalent diseases in elderly male patients presented to emergency. Infectious diseases like UTI, pneumonia, etc., are common causes of AKI. Hypertension, followed by diabetes, was the leading comorbid condition attributed to AKI, whereas a large group of people had no underlying disease.

DECLARATIONS

Conflict of Interest

None

Funding

None

Ethical Clearance

Ethical clearance was received from the Institutional Review Committee, Institute of Medicine (IOM), Kathmandu, Nepal, with reference number 357/(6-11)E2/076/077.

Consent for Study

Verbal consent was taken from the patient or the patient's relatives.

Consent for Publication

All authors consented to the publication of the study.

REFERENCES

1. Lopes JA, Jorge S. The RIFLE and AKIN classifications for acute kidney injury: a critical and comprehensive review. Clin Kidney J. 2013 Feb;6(1):8–14. | DOI | PubMed | Google Scholar | Full Text | Weblink |
2. 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 [Internet]. 2007 Apr [cited 2024 Sep 29];18(4):1292–8. | DOI | PubMed | Google Scholar | Full Text | Weblink |
3. Ali T, Roderick P. Epidemiology of Acute Kidney Injury. In: Jörres A, Ronco C, Kellum JA, editors. Management of Acute Kidney Problems [Internet]. Berlin, Heidelberg: Springer Berlin Heidelberg; 2010 [cited 2024 Sep 29]. p. 63–73. | Full Text | Weblink |
4. Bagshaw SM, George C, Bellomo R. Changes in the incidence and outcome for early acute kidney injury in a cohort of Australian intensive care units. Crit Care [Internet]. 2007 [cited 2024 Sep 29];11(3):R68. | DOI | PubMed | Google Scholar | Full Text | Weblink |
5. Lameire N, Van Biesen W, Vanholder R. The changing epidemiology of acute renal failure. Nat Clin Pract Nephrol [Internet]. 2006 Jul 1 [cited 2024 Sep 29];2(7):364–77. | DOI | PubMed | Google Scholar | Full Text | Weblink |
6. Susantitaphong P, Cruz DN, Cerda J, Abulfaraj M, Alqahtani F,

Koulouridis I, et al. World Incidence of AKI: A Meta-Analysis. Clin J Am Soc Nephrol [Internet]. 2013 Sep [cited 2024 Sep 29];8(9):1482–93. | DOI | PubMed | Google Scholar | Weblink |
7. Xu X, Nie S, Liu Z, Chen C, Xu G, Zha Y, et al. Epidemiology and Clinical Correlates of AKI in Chinese Hospitalized Adults. Clin J Am Soc Nephrol [Internet]. 2015 Sep [cited 2024 Sep 29];10(9):1510–8. | DOI | PubMed | Google Scholar | Weblink |
8. Raimann JG, Riella MC, Levin NW. International Society of Nephrology's 0by25 initiative (zero preventable deaths from acute kidney injury by 2025): focus on diagnosis of acute kidney injury in low-income countries. Clin Kidney J [Internet]. 2018 Feb 1 [cited 2024 Sep 29];11(1):12–9. | DOI | PubMed | Google Scholar | Full Text | Weblink |
9. Khoundabi B, Kazemnejad A, Mansourian M, Kazempoor Dizaji M, Hashemian SM. Acute Kidney Injury in ICU Patients Following Non-Cardiac Surgery at Masih Daneshvari Hospital: Joint Modeling Application. Tanaffos. 2015;14(1):49–54. | PubMed | Google Scholar | Full Text |
10. Khoundabi B, Kazemnejad A, Mansourian M, Hashemian SM, Kazempoor Dizaji M. Acute Kidney Injury Risk Factors For ICU Patients Following Cardiac Surgery: The Application of Joint Modeling. Trauma Mon [Internet]. 2016 Mar 28 [cited 2024 Sep 29];21(4):e23749. | DOI | PubMed | Google Scholar | Full Text | Weblink |
11. Safari S, Hashemi B, Forouzanfar MM, Shahhoseini M. Epidemiology and Outcome of Patients with Acute Kidney Injury in Emergency Department; a Cross-Sectional Study. Emergency [Internet]. 2018;6(1):e20. | PubMed | Google Scholar | Full Text | Weblink |
12. Reynolds T, Sawe HR, Lobue N, Mwafongo V. 107 Most Frequent Adult and Pediatric Diagnoses Among 60,000 Patients Seen in a New Urban Emergency Department in Dar Es Salaam, Tanzania. Ann Emerg Med [Internet]. 2012 Oct [cited 2024 Sep 29];60(4):S39. | DOI | Google Scholar | Weblink |
13. Sylvanus E, Sawe HR, Muhanuzi B, Mulesi E, Mfinanga JA, Weber EJ, et al. Profile and outcome of patients with emergency complications of renal failure presenting to an urban emergency department of a tertiary hospital in Tanzania. BMC Emerg Med [Internet]. 2019 Dec [cited 2024 Sep 19];19(1):11. | DOI | PubMed | Google Scholar | Full Text | Weblink |
14. Shrestha B, Shrestha S, Shrestha R, Paudel P, Dhakal HK, Shah MR, et al. Clinical profile and outcome of acute kidney injury in intensive care unit of a teaching hospital. J Chitwan Med Coll [Internet]. 2018 Mar 31 [cited 2024 Sep 19];8(1):32–5. | Google Scholar | Full Text | Weblink |
15. Osman M, Shigidi M, Ahmed H, Abdelrahman I, Karrar W, Elhassan E, et al. Pattern and outcome of acute kidney injury among Sudanese adults admitted to a tertiary level hospital: a retrospective cohort study. Pan Afr Med J [Internet]. 2017 [cited 2024 Sep 29];28(1):1–7. | DOI | PubMed | Google Scholar | Full Text | Weblink |
16. Patel U, Pasari A, Balwani M, Bhawane A, Tolani P, Acharya S. Clinical profile of acute kidney injury in a tertiary care center in the Tropical Region. J Integr Nephrol Androl [Internet]. 2018 [cited 2024 Sep 29];5(4):130. | DOI | Google Scholar | Weblink |