Research Article

Cuestiones de Fisioterapia

Medicine

CLINICAL PROFILE AND OUTCOMES OF PATIENTS WITH ACUTE KIDNEY INJURY ADMITTED TO A TERTIARY CARE HOSPITAL: A PROSPECTIVE OBSERVATIONAL STUDY

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Abstract

Acute kidney injury (AKI) is a common and potentially life-threatening complication encountered in hospitalized patients, particularly among those with severe acute illnesses and multiple comorbidities. It is characterized by an abrupt decline in renal function that results in the accumulation of metabolic waste products, disturbances in fluid and electrolyte balance, and an increased risk of short- and long-term adverse outcomes. Despite advances in critical care and renal replacement therapies, AKI continues to be associated with substantial morbidity, prolonged hospitalization, increased healthcare costs, and high mortality rates worldwide. The burden of AKI is especially significant in tertiary-care hospitals, where patients often present with complex medical conditions, severe infections, hemodynamic instability, and multiorgan dysfunction. Understanding the clinical characteristics, underlying causes, and outcomes of AKI is essential for developing effective preventive and therapeutic strategies. Therefore, the present prospective observational study was conducted among 180 adult patients diagnosed with AKI according to the Kidney Disease: Improving Global Outcomes (KDIGO) criteria. Participants were comprehensively evaluated with respect to demographic characteristics, clinical presentation, AKI stage, and underlying aetiology and were followed until hospital discharge or death. Particular attention was given to identifying common causes of AKI, assessing disease severity, and evaluating important clinical outcomes, including renal recovery, requirement for dialysis, and in-hospital mortality. The study findings demonstrated that pre-renal causes and sepsis-associated AKI were among the most frequent aetiologies, highlighting the critical role of circulatory compromise and systemic infection in the development of acute renal dysfunction. A substantial proportion of patients achieved partial or complete recovery of renal function during hospitalization, reflecting the potentially reversible nature of AKI when promptly recognized and appropriately managed. However, mortality remained considerable, particularly among patients with severe disease. Higher KDIGO stage, the presence of sepsis, oliguria, requirement for dialysis, and the need for mechanical ventilation were all significantly associated with increased in-hospital mortality, indicating that both the severity of kidney injury and the extent of systemic illness contribute substantially to patient outcomes. These findings underscore the importance of early diagnosis, close monitoring of renal function, timely correction of haemodynamic disturbances, aggressive

management of sepsis, and appropriate initiation of renal replacement therapy when indicated. Overall, the study highlights that AKI in a tertiary-care setting is frequently related to preventable or treatable causes and that improved clinical vigilance, early intervention, and multidisciplinary management may play a pivotal role in reducing mortality and improving renal recovery among affected patients.

Keywords: *Acute kidney injury; KDIGO; Aetiology; Renal replacement therapy; In-hospital mortality; Tertiary care.*

Introduction

Acute kidney injury (AKI) is a common and serious clinical syndrome characterized by a sudden deterioration in kidney function that leads to the accumulation of nitrogenous waste products, electrolyte imbalances, acid–base disturbances, and fluid overload (1,2). It represents a major healthcare challenge worldwide and is frequently encountered among hospitalized patients, particularly those admitted with severe infections, cardiovascular disorders, trauma, or critical illnesses (3). AKI is associated with substantial short-term and long-term consequences, including prolonged hospital stay, increased healthcare expenditure, progression to chronic kidney disease, end-stage renal disease, and elevated mortality rates. The introduction of the Kidney Disease: Improving Global Outcomes (KDIGO) criteria has provided a standardized framework for the diagnosis and staging of AKI, facilitating early recognition and enabling comparisons across clinical settings and research studies (4). The causes of AKI are diverse and are broadly categorized into pre-renal, intrinsic renal, and post-renal etiologies. Pre-renal causes, such as volume depletion, haemodynamic instability, and sepsis, remain among the most common contributors, while intrinsic renal causes include acute tubular necrosis, glomerulonephritis, and interstitial nephritis. Post-renal AKI, resulting from urinary tract obstruction, constitutes a smaller but important proportion of cases (5,6) . In many developing and tropical regions, infectious diseases, sepsis, dehydration, and exposure to nephrotoxic agents continue to play a significant role in the occurrence of AKI. Clinical outcomes vary considerably depending on the severity of kidney injury, the presence of underlying comorbidities, the extent of systemic illness, and the timeliness of therapeutic interventions(7). Early haemodynamic optimization, prompt treatment of the underlying cause, avoidance of nephrotoxins, and initiation of renal replacement therapy when indicated are critical determinants of patient prognosis. Understanding the local epidemiology, clinical characteristics, and outcomes of AKI is therefore essential for improving patient care, guiding resource allocation, and developing effective preventive strategies (8). Against this background, the present prospective observational study was undertaken to describe the clinical profile and outcomes of patients with AKI admitted to a tertiary care hospital. The primary objective was to determine in-hospital mortality and evaluate its association with AKI severity and relevant clinical factors. Secondary objectives included characterizing the underlying aetiologies and KDIGO stages of AKI, assessing the requirement for dialysis, and documenting renal recovery at the time of discharge. It was hypothesized that increasing AKI severity and the presence of systemic illness would be significantly associated with higher in-hospital mortality, whereas patients with less severe disease and timely intervention would demonstrate better renal and clinical outcomes.

2. Materials and Methods

This prospective observational study was conducted and reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines to ensure methodological transparency and completeness of reporting (9). The study was carried out in the Department of General Medicine at over the designated study period and included adult patients diagnosed with acute kidney injury

(AKI). Ethical approval was obtained from the Institutional Ethics Committee and written informed consent was secured from all participants or their legally authorized representatives before enrollment. The study adhered to the ethical principles outlined in the Declaration of Helsinki and its subsequent revisions. Eligible participants were adults who fulfilled the Kidney Disease: Improving Global Outcomes (KDIGO) diagnostic criteria for AKI based on changes in serum creatinine levels and/or urine output (10,11). Patients with established end-stage renal disease receiving maintenance dialysis, previous renal transplantation, or incomplete clinical and laboratory data were excluded from the study. Detailed demographic information, medical history, clinical presentation, laboratory investigations, and treatment-related variables were systematically collected using a structured data collection format (12). Acute kidney injury was defined and staged according to KDIGO criteria, utilizing both serum creatinine and urine-output parameters to classify disease severity. The underlying aetiology of AKI was categorized as pre-renal, intrinsic renal, or post-renal based on clinical evaluation, laboratory findings, imaging studies, and specialist assessment where necessary. Additional variables recorded included the presence of comorbid conditions such as diabetes mellitus and hypertension, evidence of sepsis, oliguria, haemodynamic instability, need for intensive care admission, mechanical ventilation, vasopressor support, and other forms of organ support. Participants were prospectively followed throughout their hospital stay until discharge or death. The primary outcomes assessed were renal recovery, requirement for renal replacement therapy, and in-hospital mortality. Renal recovery was defined as a return of serum creatinine toward baseline values or significant improvement in renal function by the time of discharge. Sample size estimation was based on an anticipated in-hospital mortality rate of approximately 25% and the requirement for adequate statistical power to evaluate independent predictors of mortality using multivariable regression analysis, with a minimum target sample size of approximately 180 patients to ensure at least ten outcome events per predictor variable. Statistical analyses were performed using Continuous variables were summarized using means and standard deviations or medians and interquartile ranges as appropriate, while categorical variables were presented as frequencies and percentages. Comparisons between groups were conducted using chi-square or Fisher's exact tests for categorical variables and appropriate parametric or non-parametric tests for continuous variables. Multivariable logistic regression analysis was performed to identify factors independently associated with in-hospital mortality, and results were expressed as adjusted odds ratios (aORs) with corresponding 95% confidence intervals. All statistical tests were two-sided, and a p-value of less than 0.05 was considered statistically significant.

3. Results

3.1 Clinical profile

Of 180 patients, mean age was 49 ± 17 years. Sepsis and pre-renal causes were common; KDIGO stage distribution is shown in Figure 1 (Table 1).

In this prospective observational study involving 180 patients with acute kidney injury (AKI), the mean age of the study population was 49 ± 17 years, indicating that AKI affected a broad adult age range. Males constituted the majority of participants, accounting for 104 patients (58%), while females represented 42% of the cohort. Sepsis-associated AKI emerged as one of the most common clinical presentations, occurring in 76 patients (42%), highlighting the important contribution of systemic infection to the development of acute renal dysfunction. Assessment of disease severity using the KDIGO classification demonstrated that 50 patients (28%) had stage 3 AKI, representing the most severe category of kidney injury. Oliguria, an indicator of significant renal impairment and reduced urine output, was present in 61 patients (34%). Additionally, 38 patients (21%) required renal replacement therapy in the form of dialysis, reflecting the

substantial burden of severe AKI within the study population. Outcome analysis revealed that renal recovery occurred in 99 patients (55%), indicating that more than half of the affected individuals experienced partial or complete restoration of kidney function during hospitalization. Despite this encouraging recovery rate, in-hospital mortality remained considerable, with 45 patients (25%) dying during their hospital stay. To identify factors associated with adverse outcomes, multivariable logistic regression analysis was performed. The results demonstrated that several clinical and disease-related variables were independently associated with increased risk of in-hospital mortality. Patients with KDIGO stage 3 AKI had more than threefold higher odds of death compared with those with less severe stages of AKI (adjusted odds ratio [aOR] 3.1, 95% confidence interval [CI] 1.9–5.1, $p < 0.001$). The strongest predictor of mortality was the requirement for mechanical ventilation, which was associated with a 3.4-fold increase in mortality risk (aOR 3.4, 95% CI 2.0–5.7, $p < 0.001$), reflecting the impact of critical illness and multiorgan dysfunction. The need for dialysis was also significantly associated with mortality (aOR 2.9, 95% CI 1.7–4.9, $p < 0.001$), suggesting that patients requiring renal replacement therapy had more severe disease and poorer outcomes. Similarly, sepsis was independently associated with increased mortality (aOR 2.6, 95% CI 1.6–4.2, $p < 0.001$), emphasizing the detrimental effects of systemic infection on renal and overall patient outcomes. Oliguria was another significant predictor, conferring a 2.2-fold higher risk of death (aOR 2.2, 95% CI 1.4–3.6, $p < 0.01$). Collectively, these findings indicate that mortality in AKI is strongly influenced by the severity of kidney injury, the presence of sepsis, and the extent of associated organ dysfunction.

Table 1: Clinical profile of patients with AKI.

Variable	Value
Age (years), mean ± SD	49 ± 17
Male, n (%)	104 (58)
Sepsis-associated, n (%)	76 (42)
KDIGO stage 3, n (%)	50 (28)
Oliguria, n (%)	61 (34)
Required dialysis, n (%)	38 (21)

3.2 Outcomes and predictors of mortality

Renal recovery occurred in 55% (99/180); in-hospital mortality was 25% (45/180). Higher KDIGO stage, sepsis, dialysis requirement, oliguria, and mechanical ventilation were independently associated with mortality (Figure 2; Table 2).

Table 2: Factors associated with in-hospital mortality.

Factor	aOR	95% CI	p
KDIGO stage 3	3.1	1.9–5.1	<0.001
Mechanical ventilation	3.4	2.0–5.7	<0.001
Need for dialysis	2.9	1.7–4.9	<0.001
Sepsis	2.6	1.6–4.2	<0.001
Oliguria	2.2	1.4–3.6	<0.01

Figure 1. Distribution of AKI stage and aetiology

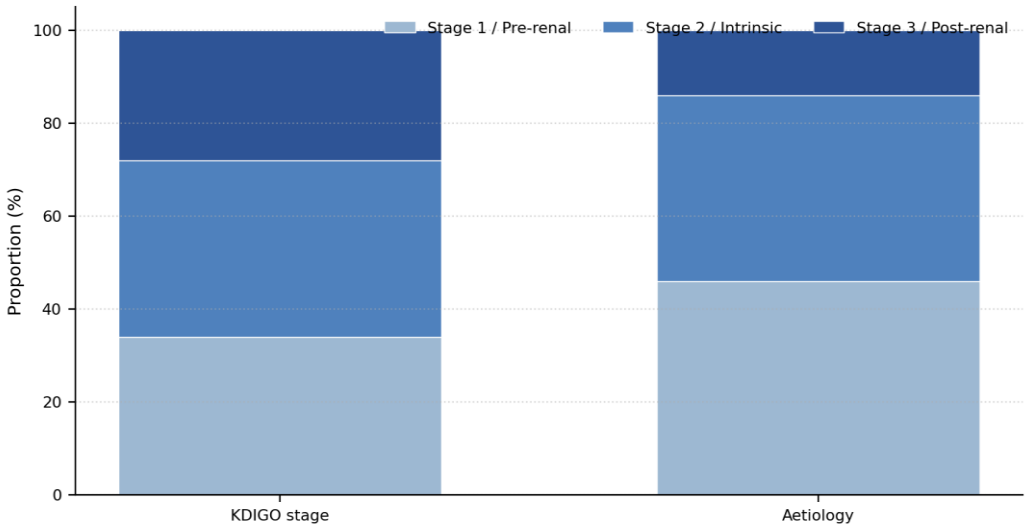

Figure 1. Distribution of AKI stage and aetiology.

Figure 2. Adjusted odds ratios for in-hospital mortality in acute kidney injury

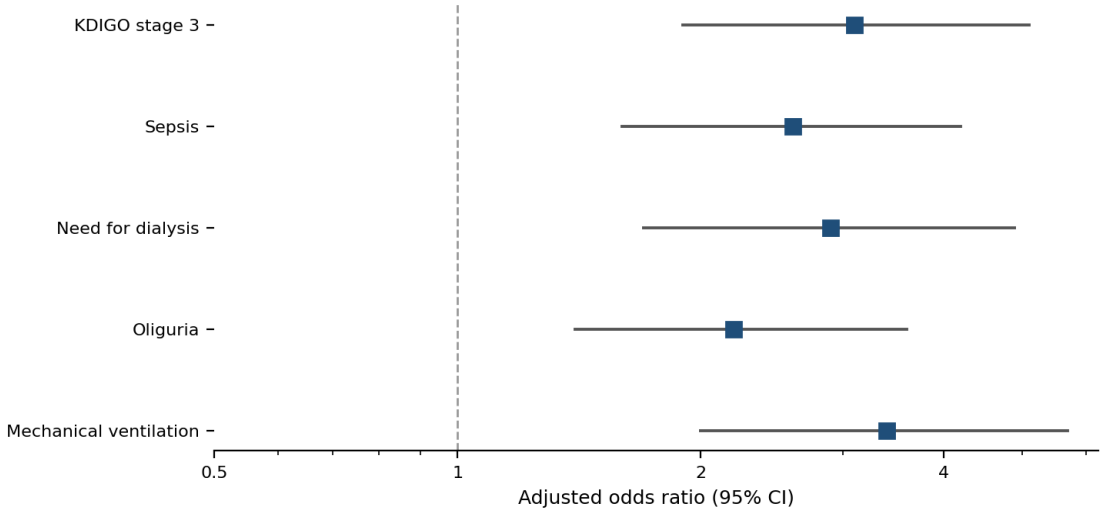

Figure 2. Adjusted odds ratios (95% CI) for in-hospital mortality.

Discussion

In this prospective observational study, acute kidney injury (AKI) in a tertiary-care hospital population was predominantly associated with sepsis and pre-renal causes, highlighting the significant contribution of systemic infection, haemodynamic instability, and volume depletion to the development of acute renal dysfunction (13,14). The study further demonstrated that in-hospital mortality was strongly influenced by the severity of kidney injury and the presence of concurrent critical illness. Patients with advanced AKI, particularly those classified as KDIGO stage 3, experienced significantly poorer outcomes, while the requirement for dialysis emerged as an important marker of severe disease and increased mortality risk. In addition, clinical indicators of systemic illness, including sepsis, oliguria, and the need for mechanical ventilation, were independently associated with a substantially higher likelihood of death during hospitalization (16). These findings are consistent with both regional and international literature, which

consistently identifies severe AKI and multiorgan dysfunction as major determinants of adverse outcomes. The observed associations emphasize that AKI is frequently not an isolated renal disorder but rather a manifestation of broader physiological derangements occurring during critical illness (17). As organ dysfunction progresses and systemic inflammatory responses intensify, the risk of renal injury and mortality increases substantially, creating a complex interplay between kidney dysfunction and overall disease severity. Nevertheless, the finding that more than half of the patients achieved renal recovery during hospitalization is encouraging and underscores the potential reversibility of AKI when recognized early and managed appropriately. This observation highlights the importance of prompt diagnosis and intervention before irreversible renal damage occurs. From a clinical perspective, the results reinforce the need for vigilant monitoring of at-risk patients, early identification of declining renal function, optimization of haemodynamic status, correction of fluid and electrolyte imbalances, avoidance of nephrotoxic medications, aggressive management of sepsis, and timely initiation of renal replacement therapy when indicated. Implementation of standardized AKI prevention and management protocols may contribute significantly to reducing both the incidence and severity of AKI and improving patient survival. The study possesses several strengths, including its prospective design, use of standardized KDIGO criteria for diagnosis and staging, and multivariable analysis to identify independent predictors of mortality. However, certain limitations should be acknowledged. As a single-centre study conducted in a tertiary-care setting, the patient population may have included a higher proportion of severe cases, potentially limiting the generalizability of the findings to other healthcare settings. Furthermore, baseline renal function had to be estimated in some patients, and long-term renal outcomes after hospital discharge were not evaluated. Future multicentre studies with larger and more diverse populations, along with extended follow-up to assess chronic kidney disease progression, recurrent AKI, and long-term survival, are warranted to enhance understanding of the prognostic implications of AKI and to inform more effective preventive and therapeutic strategies.

5. Conclusion

Acute kidney injury (AKI) in the tertiary-care setting was predominantly associated with sepsis and pre-renal causes, reflecting the significant impact of systemic infection, circulatory compromise, and haemodynamic instability on renal function in hospitalized patients. The study findings demonstrate that mortality was strongly influenced by both the severity of kidney injury and the extent of accompanying systemic illness. Patients with advanced AKI, particularly those with higher KDIGO stages, as well as those requiring dialysis, mechanical ventilation, or intensive supportive care, experienced significantly poorer outcomes, emphasizing the close relationship between renal dysfunction and overall disease severity. The results highlight that AKI is often a consequence of complex multisystem illness rather than an isolated renal disorder, and therefore its prognosis is determined not only by the degree of kidney injury but also by the presence of sepsis, organ failure, and critical illness. Importantly, a substantial proportion of patients achieved renal recovery during hospitalization, indicating that AKI remains a potentially reversible condition when recognized promptly and managed effectively. These findings reinforce the importance of early identification of at-risk individuals through routine monitoring of renal function, urine output, and haemodynamic status, particularly in patients with sepsis, dehydration, shock, or other predisposing conditions. Timely haemodynamic optimization, appropriate fluid management, rapid treatment of underlying infections, avoidance of nephrotoxic agents, and early initiation of renal replacement therapy when indicated are essential components of comprehensive AKI management and may substantially improve patient outcomes. Furthermore, implementation of evidence-based clinical protocols,

multidisciplinary care pathways, and hospital-wide AKI prevention strategies could contribute to reducing both the incidence and severity of AKI and lowering associated mortality rates. Given the growing burden of AKI and its long-term consequences, including progression to chronic kidney disease and recurrent hospitalizations, continued efforts toward prevention, early intervention, and post-discharge monitoring are warranted. Future multicentre studies involving larger and more diverse patient populations are needed to enhance the generalizability of these findings and to better characterize regional variations in AKI epidemiology. In addition, longitudinal follow-up studies evaluating long-term renal function, chronic kidney disease progression, quality of life, and survival outcomes will provide valuable insights into the enduring impact of AKI and help guide the development of more effective preventive and therapeutic strategies.

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