Original Article
DOI: https://doi.org/10.70749/ijbr.v3i5.1158

INDUS JOURNAL OF BIOSCIENCE RESEARCH
https://induspublishers.com/IJBR
ISSN: 2960-2793/ 2960-2807

Frequency of Acute Kidney Injury in Patients Admitted with Sepsis

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ARTICLE INFO

Keywords

Sepsis, Acute Kidney Injury (AKI), KDIGO Criteria.

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Declaration

Authors' Contribution: All authors equally contributed to the study and approved the final manuscript.
Conflict of Interest: No conflict of interest.
Funding: No funding received by the authors.

Article History

Received: 01-04-2025, Revised: 21-04-2025
Accepted: 27-04-2025, Published: 03-05-2025

ABSTRACT

Background: When a patient is admitted with sepsis, acute kidney damage (AKI) is a frequent and dangerous consequence. It is linked to higher mortality, dialysis requirements, and morbidity. **Objective:** to evaluate the stages and clinical results of AKI and ascertain its prevalence in sepsis patients. **Methods:** A tertiary care hospital in Quetta hosted a six-month qualitative study. Purposive sample was used to select 130 septic patients in total. KDIGO criteria were used to diagnose AKI, and information was gathered from interviews and clinical records. **Results:** 49.2% of individuals with sepsis had AKI. The most prevalent stage of AKI was Stage 1 (39.1%), which was followed by Stage 2 (32.8%) and Stage 3 (28.1%). 12.5% of AKI patients passed away, 18.8% needed dialysis, and 43.8% recovered completely. **Conclusion:** This study reveals a high incidence of acute kidney injury (AKI) in sepsis patients, with 49.2% developing AKI. Men, middle-aged, and older individuals are more susceptible. The severity of septic AKI, including mortality and dialysis needs, significantly impacts prognosis. Early identification and intervention remain critical, as prompt treatment can prevent progression to advanced AKI stages. The findings suggest that conventional observation, early biomarkers, and personalized care are essential for better outcomes. Improved clinical practices can ultimately enhance survival rates and reduce complications in sepsis patients in critical care settings.

INTRODUCTION

Poor Acute kidney injury stands as an independent factor which predicts poor outcomes in intensive care unit (ICU) patients despite being a common clinical issue [1-4]. During the last couple of years two key nationwide cohort studies reported the extensive occurrence of AKI in 36% of all patients seeking ICU admission. Research from observational studies indicates that AKI incidents keep increasing in prevalence [7, 8]. Acute kidney injury (AKI) burden increases substantially because of three primary reasons including patient demographic changes (increasing age with comorbid conditions), severe illness course (multiple organ failure syndrome) and complicated treatments such as organ transplantation [9, 10]. Critical illness brings about multiple factors which combine to produce the complex nature of kidney injury. The medical community has repeatedly recognized sepsis to play a dominant role in causing acute kidney injury during critical illness period [11-18]. The epidemiological information regarding septic AKI among critical patients exists only in a few research publications to date [12–18]. Multiple studies conducted at different research centers indicate that sepsis cases account for 46% to 48% of all cases of AKI observed in critically ill patients [12,15]. The research focused on sepsis presented findings indicating that AKI occurred in 10% to 50% of studied patients [13,14,16–18]. The clinical practice benefits from recognizing whether AKI stems from bacterial sources or different nonpeptic causes [19].

Current scientific studies indicate septic acute kidney injury follows its own distinctive mechanism to cause kidney damage [9,20–22]. Patients who develop AKI due to sepsis demonstrate larger modifications in personal traits as well as treatment responses and medical outcomes in comparison to those with nonpeptic kidney injury.

The patients who develop sepsis usually experience rapid onset acute kidney injury (AKI). The Australian New Zealand Intensive Care Society Adult Patient Database revealed an AKI occurrence of 42.1% among

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patients diagnosed with sepsis according to Bagshaw and colleagues [23].

Kumar and associates [24] detected that severe sepsis patients experienced AKI as their principal organ dysfunction.

The incidence of all AKI occurrences in critically sick patients reached more than 40% because of sepsis elements as demonstrated by two multicenter study approaches [25, 26]. The development of AKI in patients who have severe sepsis leads to increased healthcare costs while functioning independently as an unfavorable outcome predictor [24,27].

LITERATURE REVIEW

The medical term "AKI" includes multiple renal damage syndromes with the most critical cases requiring dialysis as treatment.

Serious studies reveal that AKI occurrence frequency has risen across various clinical environments that involve critically sick individuals [28, 29].

The rising AKI occurrence remains unclear since better detection methods and protocol refinement and improved diagnostic methods might be responsible factors. The mentioned characteristics should affect AKI requiring dialysis to a lesser extent.

Studies have shown that the number of AKI-D cases increased alongside AKI incidents although medical staff should have implemented preventative measures during illness progression to reduce dialysis requirements [30]. The current state of knowledge does not provide detailed information about AKI-D incidence nor its impact because epidemiologic research evaluates AKI occurrence patterns in sepsis patients but cannot specifically determine AKI-D development and consequences [22, 23]. Knowledge of these estimates holds fundamental importance since severe sepsis together with AKI-D leads to costly healthcare expenses and consumes resources extensively while producing adverse results.

Health care planners alongside policymakers would receive improved ability to distribute financing toward essential hospital admissions effectively. The risk assessment tools used in planning next therapeutic trials would benefit from this data as would basically prognosticating techniques of identifying patient outcomes.

This would allow policymakers and health care planners to allocate resources to a significant portion of hospitalizations in an optimal manner. Furthermore, prognostication, risk assessment, and the planning of next therapeutic trials would all benefit from this information.

A dysregulated Sepsis, resulting in life threatening failure of the host's multiple organs, including acute kidney damage (AKI), is a hallmark of host response to infection. Large increase in morbidity and mortality in septic patients is associated with acute kidney injury, which is frequent and dangerous. As reported by many investigators, the prevalence of AKI among septic patients varies from 22% to more than 50% [31]. Sepsis induced AKI is a multi-complex pathophysiology including systemic inflammation, renal hypoperfusion, microvascular dysfunction and direct cellular destruction [32].

Even with some advances in sepsis management, AKI remains important, in particular ICUs. In these individuals, multicenter research identified that 59 percent of sepsis related ICU patients who developed AKI in hospital [33]. This has a bearing of early detection of renal involvement and aggressive treatment of renal involvement in septic patients. However, compared to patients with septic AKI, more renal replacement therapy (RRT) is demanded, and hence, clinical management becomes more than more challenging and healthcare expenses increase [34].

These biomarkers, i.e. cystatin C and neutrophil gelatinase-associated lipocalin (NGAL) are shown to have potential in early diagnosis of AKI in septic patients, and since these biomarkers can prompt clinical professionals to start prompt therapies, it is logical [35]. They are still disputing methods of established diagnosis and prophylactic measures. Additionally, some of these patients who survive septic AKI will later go on to develop chronic kidney disease, or recurrent renal failure, suggesting a poor future [36].

On a whole, sepsis continues to be a common and negative outcome of AKI. Treatment of this high-risk population is more tied to prevention, early identification, and individualized plan that needs to be improved to achieve better renal and general outcomes.

RESEARCH OBJECTIVE

The main aim of this study is to determine the prevalence of acute kidney damage (AKI) in patients admitted with sepsis. The objectives of this study are to find the prevalence of AKI in septic patients and relate that to clinical outcomes such as length of hospital stay, requirement for renal replacement treatment and mortality. The objective of the study was to assess the prevalence and contributing variables of equines to improve early detection, and management techniques for AKI in patients with sepsis. Such a change would enhance patient prognosis and decrease complications in critical care situations.

METHODOLOGY

Between October 2024 and March 2025, a six months qualitative study was performed in a Quetta tertiary care hospital. Main purpose of this study was to find out how widespread acute kidney injury (AKI) in sepsis patients

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who were admitted. Thus, 130 patients were purposively sampled to meet the inclusion criteria. Included patients were adult patients aged 18 years or older admitted with a clinical sepsis diagnosis according to sepsis-3 criteria. The study excluded patients with known renal structural abnormalities, preexistent chronic kidney disease and those who were undergoing maintenance dialysis in order to ensure a true measure of sepsis induced AKI. Data from medical personnel, involved in patients' treatment with sepsis were gathered by reviewing clinical records and laboratory results as well as in depth interviews with these medical personnel. The diagnosis of AKI was based on the kidney disease: Improving Global Outcomes (KDIGO) criteria, which include alteration in blood creatinine and/or urine output. Also recorded was in-depth qualitative information concerning laboratory tests, clinical progression and treatment of AKI. Ethical approval was provided by the hospital review board, and all participants or their legal guardians gave their informed consent. The gathered data was subjected to thematic analysis to find trend about the start, course and results of AKI in septic patients. The results are expressed in tabular form to highlight demographic distribution, clinical characteristics, AKI staging and related consequences.

RESULTS

Table 1 presents the demographic distribution of the study participants. The majority of patients (34.6%) were aged between 51–70 years, suggesting that middle-aged to older adults were more likely to be admitted with sepsis and at risk of developing AKI. Patients aged 31–50 years made up 30.8%, while those over 70 years comprised 17.7%, indicating that sepsis affects a wide age range but predominantly impacts older adults. A smaller proportion (16.9%) were in the 18–30 age group.

Table 1

Demographic Characteristics of Patients (n=130)

Age Group (years)	Frequency	Percentage
18–30	22	16.9%
31–50	40	30.8%
51–70	45	34.6%
>70	23	17.7%
Total	130	100%

Table 2 shows the gender distribution among the study participants. Males constituted a greater proportion of the patients (58.5%), while females accounted for 41.5%. This finding suggests a possible gender-related difference in either the incidence of sepsis, the severity requiring admission, or the risk of developing AKI. However, further studies would be needed to explore gender-specific vulnerabilities.

Table 2

Gender Distribution

Gender	Frequency	Percentage
Male	76	58.5%
Female	54	41.5%
Total	130	100%

Figure 1

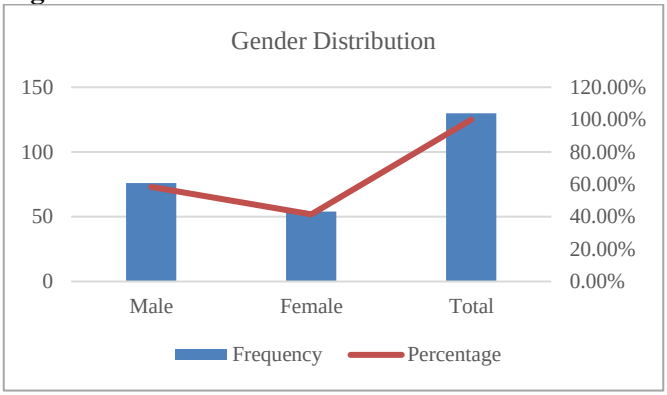

Table 3 illustrates the frequency of acute kidney injury (AKI) among sepsis patients. AKI was identified in 64 patients (49.2%), nearly half of the study population. This finding highlights the significant burden of renal complications among sepsis patients and reinforces the critical need for early monitoring and intervention to prevent AKI development in septic cases.

Table 3

Frequency of Acute Kidney Injury in Sepsis Patients

AKI Status	Frequency	Percentage
Present	64	49.2%
Absent	66	50.8%
Total	130	100%

Table 4 details the staging of AKI according to the Kidney Disease: Improving Global Outcomes (KDIGO) criteria among the 64 patients who developed AKI. Stage 1 was the most frequent stage, observed in 39.1% of cases, suggesting early-stage kidney injury was common. Stage 2 was noted in 32.8% of patients, and Stage 3, representing the most severe form of AKI, occurred in 28.1% of cases. The significant proportion of Stage 2 and 3 AKI reflects the severity of kidney dysfunction associated with sepsis in a considerable number of patients.

Table 4

Stages of AKI Based on KDIGO Criteria (n=64)

AKI Stage	Frequency	Percentage
Stage 1	25	39.1%
Stage 2	21	32.8%
Stage 3	18	28.1%
Total	64	100%

Figure 2

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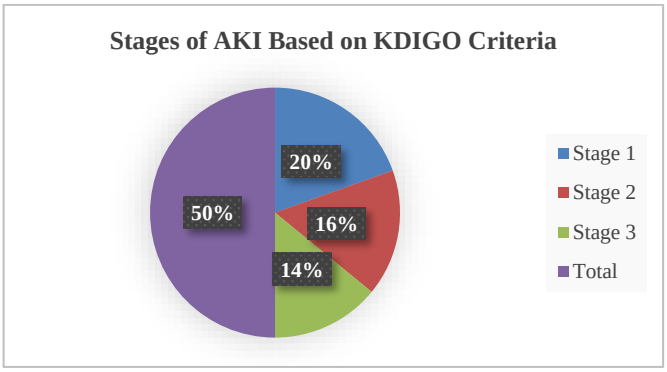

Table 5 summarizes the clinical outcomes among the 64 patients diagnosed with AKI. Encouragingly, full recovery was achieved in 43.8% of patients. Partial recovery, with some persistent renal impairment, was noted in 25%. Twelve patients (18.8%) required dialysis during their clinical course, reflecting severe kidney dysfunction. Sadly, mortality was observed in 8 patients (12.5%), highlighting the serious consequences associated with sepsis-induced AKI and the importance of timely diagnosis and management.

Table 5
Clinical Outcomes in AKI Patients (n=64)

Outcome	Frequency	Percentage
Recovered Fully	28	43.8%
Partial Recovery	16	25.0%
Required Dialysis	12	18.8%
Mortality	8	12.5%
Total	64	100%

DISCUSSION OF RESULTS

This study aimed to assess the prevalence of acute kidney injury (AKI) in sepsis patients as well as evaluates AKI and clinical outcomes. Results suggest the therapeutic importance of early diagnosis and intervention and demonstrate a prevalence of AKI in septic patients in a tertiary care setting in Quetta shown to resemble findings of Akine prevalence in the global literature.

Table 1 shows the age distribution of the study population and the bulk of patients (34.6%) belonged to the 51–70 age range. Consequently, middle aged and older persons may be more at risk of sepsis, perhaps because they have an impaired immune system with other comorbid conditions (diabetes, hypertension, etc), suggesting this. These variables have been shown to be associated with increased vulnerability to sepsis and AKI [31].

As per global trends of male predominance (58.5%) of septic patients, Table 2 shows a male predominate 58.5% of septic patients. This discordance could be a result of differences in lifestyles, hormonal fluctuations, and men's delayed health seeking behavior [32].

Figure 3 shows the overall occurrence of AKI in septic patients among whom 49.2% of the total of 130 patients developed AKI. This [33] is consistent with the results from previous multicenter investigations that have demonstrated that prevalence rates of AKI in sepsis patients are in the range of 40–60 [%. The high occurrence is related to both sepsis and kidney damage, and this could be related to systemic inflammation-induced sepsis, hemodynamic instability or compromised renal perfusion.

In terms of the classification of AKI according to the KDIGO criteria, the stages are listed in Table 4. Stage 1 was the most common stage of AKI and accounted for 39.1%, while 32.8% of episodes were Stage 2 and 28.1% were Stage 3. However that implies that early-stage AKI is more common probably because the watchfulness has improved and the knowledge has improved. Yet a considerable proportion of patients progressed to more severe phases and therefore prompt and forceful therapies are needed to halt deterioration [34].

Table 5 looks at clinical outcomes for patients with AKI. Among the 64 patients of AKI, partial recovery occurred in 25% and full recovery in 43.8%. In fact, 12.5% died of their illness and 18.8% they required dialysis. These findings are consistent with the observation's made around the world, that patients developing AKI in sepsis have high mortality, prolonged hospital stay and poor outcome [35, 36]. About one twentieth of the patients need dialysis, which indicates that the severity of renal compromise in septic AKI is high.

The study concludes that AKI is a common, dangerous sepsis complication in the hospitalized patients, and has severe consequences for outcomes. High prevalence and related morbidity make clinical care with better diagnostic procedures, biomarker based early detection procedures and early, tailored treatment necessary. These can improve dramatically the chance that critically sick patients survive and recover with AKI in sepsis, while reducing the burden of AKI in sepsis.

CONCLUSION

This study highlights a very high incidence of acute kidney damage (AKI) in patients with sepsis: 49.2% of patients were admitted with sepsis went on to develop some degree of AKI. The emphasis is on the fact that men are more likely to be affected, and middle aged and older people are more vulnerable. AKI stages distribution and related consequences of septic AKI, including mortality and need for dialysis, are shown as being of a severe effect on patient prognosis. Early identification and management are still important since early therapy may stop the progression to more advanced stages. The results show that conventional observation is necessary, early biomarkers need to be used, and personalized treatment is required. However, better clinical practices can in time boost survival rates and reduce complications in sepsis patients in the critical care settings.

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