

Incidence of Acute Kidney Injury in Acute Febrile Illness**Srikanth Nakka¹, Dharam Dev Golani², Nagavaram Harikrishna³, T. Krishna Kumar⁴**¹DM Cardiology, Dept. of Cardiology, Nizams Institute of Medical Sciences, Hyderabad, Telangana, India²Ex-Senior Physician, MD (General Medicine), DDU Hospital, GNCT of Delhi, India³DNB Cardiology, Dept. of Cardiology, Yashoda Hospitals, Secunderabad, Hyderabad, Telangana, India⁴DNB Cardiology, Consultant Cardiologist, Yashoda Hospitals, Secunderabad, Telangana, India

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Abstract**Background:** Acute kidney injury (AKI) denotes a sudden and reversible kidney function reduction characterized by increased creatinine or decreased urine volume. One of the leading causes of death in AKI is acute febrile illness.**Aim:** The aim of this study was to evaluate the clinical profile of acute kidney damage in acute febrile illness.**Materials and Methods:** Original research study was carried out at the department of General Medicine in Pimpri, Pune. All 100 patients diagnosed with acute febrile illness who were admitted to the medical wards and intensive care unit (ICU) between September 2020 and August 2024 were included in the study.**Results:** In our study 70% of the study population are males, and the female population constituted 30%. On further evaluation of RIFLE grade 27% are under the risk category, 13 % under the injury category, and 10% under the failure category. On AKIN grade evaluation, 31% are grade 1, 8% are grade 2, and 10% are under the grade 3 category. KDIGO AKI stage 1, 2, and 3 were seen in 27 (27%), 9 (9%), and 14(14.0 %) of AKI patients, respectively.**Conclusion:** According to this study, dengue is the most frequent cause of AFI and AKI. The highest burden of AKI is caused by leptospirosis, dengue, and malaria. In order to help diagnose AKI early and provide appropriate care, we recommend that doctors look into kidney function in patients with acute febrile illness who also have certain risk factors.**Keywords:** Acute Kidney Injury, Acute Febrile Illness, RIFLE, AKIN, KDIGO, Dengue.**DOI:** 10.25258/ijcpr.18.4.7This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.**Introduction**

Any acute febrile condition with an oral temperature more than 37.5°C that lasts for 24 hours to less than two weeks, including vague symptoms that are difficult to attribute to a single system, is referred to as acute febrile illness (AFI).

Fever, rashes, tachycardia, myalgia, conjunctival congestion, and other symptoms, as well as generalized body pain, vomiting, loose stools, decreased urine output, leg swelling, dyspnea, headache, cough, chest pain, and altered sensorium, can all be signs of acute febrile illness.[1–7].

Acute kidney injury (AKI) is a heterogeneous illness characterized by a sudden drop in glomerular filtration rate (GFR) that results in the retention of waste products from metabolism, such as creatinine and urea, as well as alterations in acid-base balance and electrolyte and fluid dysregulation [8].

One of the main complications of both infectious and non-infectious aetiologies is acute renal damage. One of the leading causes of death is acute febrile illness [4,6].

Reducing mortality and renal morbidity is crucial, and this goal is made even more important by the fact that, among all critically sick patients, hospitalization mortality is around 60% and dialysis reliance is 13% in survivors [9].

After varying lengths of renal replacement treatment, 41% of patients who recovered from acute renal failure had a deterioration in renal function, and 50% of patients had a five-year survival rate [10]. The economy and health infrastructure are further burdened by this [11]. Thirteen million people die each year from infectious diseases brought on by both new and well-established bacterial and viral illnesses [12]

Due to rising illness prevalence and inadequate health care infrastructure, infectious diseases cause over 50% of mortality in developing nations [4]. The majority of these illnesses are not adequately treated in the community and frequently manifest in higher centers with consequences.

On the other hand, extended periods of time spent traveling to medical facilities deteriorate organ function and reserve. In order to evaluate the clinical profile of acute kidney damage in acute febrile illness, the current study was conducted.

Materials and Methods

The study was carried out at the Department of General Medicine in Pimpri, Pune. The Institutional Ethics Committee gave their approval. According to the study design, all patients diagnosed with acute febrile illness who were admitted to the medical wards and intensive care unit (ICU) between September 2020 and August 2024 were included in the study. For the study, 100 patients with acute febrile sickness who were hospitalized to all medical wards and the intensive care unit were chosen. The conventional diagnostic criteria were used in making the diagnosis. Written and informed consent was obtained from each patient who was part of the trial. The study was explained to the patients in a language they could understand. Every participant's complete medical history was obtained, including prior, personal, drug, and addiction histories. Thorough assessment of every symptom, including rash, fever, bodily

aches, and other vague ones. The full clinical and demographic profile was assessed. After obtaining blood samples, the full biochemical profile was examined.

AKI was diagnosed and classified using the KDIGO standards. Standard rules served as the foundation for management. Renal replacement therapy (RRT) was started for the indicated patients using Sustained Low-Efficiency Daily RRT commencement (SLEDD) and Intermittent Venovenous RRT (IVVRRRT). The KDIGO criteria were followed in the selection of catheters and catheter locations. The main results were in-hospital mortality and RRT start. Every result was entered into a Microsoft Excel document, and SPSS software was used for analysis.

Results

A total of 100 patients were recruited for the study. 29% of the study population are between 21-30 years, followed by 19% are between 31-40 years group and 41-50 years groups each. 15% are under 20 years, 9% are between 51-60 years, 6 % are between 61-70 years, and only 3% are between 71-80 years age group. It is shown in Table 1.

In our study 70% of the study population are males, and the female population constituted 30%. Of the subjects, 86 (86.0) had normal USG findings, while 6 (6.0) had minor splenomegaly, 6 (6.0) had mild hepato-splenomegaly, and 2 (2.0) had mild hepatomegaly.

Table 1: Age-wise distribution of the study subjects

Age Group	Frequency	Percent
<20	15	15.0
21 - 30	29	29.0
31 - 40	19	19.0
41 - 50	19	19.0
51 - 60	9	9.0
61 - 70	6	6.0
71 - 80	3	3.0
Total	100	100.0

In our study, on further evaluation of RIFLE grade 50% are in the normal category. 27% are under the risk category, 13 % under the injury category, and 10% under the failure category. It is shown in Table 2.

Table 2: Distribution of patients according to RIFLE grade

RIFLE Grade	Frequency	Percent
Normal	50	50.0
Risk	27	27.0
Injury	13	13.0
Failure	10	10.0
Total	100	100.0

On AKIN grade evaluation, 51% are under the normal category, 31% are grade 1, 8% are grade 2, and 10% are under the grade 3 category. It is shown in Table 3.

Table 3: Distribution of patients according to AKIN grade

AKIN Grade	Frequency	Percent
Normal	51	51.0
Grade 1	31	31.0
Grade 2	8	8.0
Grade 3	10	10.0

Staging of Acute Kidney Injury: KDIGO AKI stage 1, 2, and 3 were seen in 27 (27%), 9 (9%), and 14(14.0 %) of AKI patients, respectively. It is shown in Table 4.

Table 4: Distribution of patients according to KDIGO grade

KDIGO Grade	Frequency	Percent
Normal	50	50.0
Grade 1	27	27.0
Grade 2	9	9.0
Grade 3	14	14.0

The Comparison of various diseases distribution with RIFLE grading is shown in Table 5.

Table 5: Comparison of various diseases distribution with RIFLE grading

Disease	Normal	Risk	Injury	Failure	Total
Widal	0	3	1	1	5
Lepto IgM	1	2	0	4	7
Dengue NSI	52	10	5	7	74
Dengue IgM	52	10	5	7	74
Dengue IgG	0	0	0	0	0
Chikungunya	1	1	1	0	3
Malaria	6	1	2	2	11
Bl. Culture	0	3	1	1	5
Urine culture	0	0	0	0	0

The Comparison of hemodialysis as per AKIN Grade is shown in Table 6.

Table 6: Comparison of hemodialysis as per AKIN Grade

Hemodialysis	Normal	Grade 1	Grade 2	Grade 3	Total
Yes	6	0	1	2	7
No	55	21	10	5	93

Discussion

The average age of the participants in this study was found to be 34.8 ± 15.1 years. The mean age of the study participants in the C.M. Atkar et al. [11] research was found to be 41.76 ± 12.51 years. According to Jayalal Jayapalan Nair et al.'s study, the average age of the participants was 40.34 ± 15.42 years [12].

219 (59.7%) of the 367 patients (mean age of 39.7 ± 16.9 years) included for the final analysis in the Basu et al. research were men, and 148 (40.3%) were women [3]. Our results also showed male dominance.

In our study, on further evaluation of RIFLE grade 50% are in the normal category. 27% are under the risk category, 13 % under the injury category, and 10% under the failure category. The study by Gopal Basu et al. found that, across all three classes of RIFLE classification, the mean serum creatinine at admission was considerably greater among patients with AKI than among patients without AKI. Additionally, the mean Creatine at admission

was greater for individuals who had in-hospital death. A GFR of less than $60 \text{ mL/min/1.73 m}^2$ at admission (GFR_{adm}) was predictive of both in-hospital mortality and AKI [3].

According to our study's Staging of Acute Kidney Injury, 27 (27%), 9 (9%), and 14 (14.0%) of AKI patients had KDIGO AKI stages 1, 2, and 3. It was found that 152 (46.9) participants were in Grade 1, 101 (31.2) were in Grade 2, and 71 (21.9) were in Grade 3 in the study carried out by Jayalal Jayapalan Nair et al. [12]. According to C.M. Atkar et al.'s study, 101 (72.1) individuals were in the Normal Grade, 13 (9.3) were in the Risk Grade, 10 (7.1) were in the Injury Grade, and 16 (11.4) were in the Failure Grade [11]. According to Omar et al., the prevalence of AKI was 6.8%, 5.9%, 4.1%, and 4.0%, respectively, using KDIGO criteria, AKIN criteria, RIFLE criteria, and conventional criteria. In stages 1, 2, and 3, the percentage of AKI according to KDIGO criteria was 45/69 (65.2%), 8/69 (11.6%), and 16/69 (23.2%), in that order [13].

Of the 74 people in the current research who tested positive for Dengue NS1, 52 were in Normal Grade, 12 were in Grade 1, 7 were in Grade 2, and 3 were in Grade 3.

The study by Omar et al. revealed the remaining 69 instances were placed in the AKI group, while the remaining 950 patients were placed in the non-AKI group. There were no patients with mixed infections among the latter instances; 41/69 (59.4%) had dengue, 14/69 (20.3%) had malaria, 11/69 (15.9%) had influenza, 2/69 (2.9%) had rickettsial disease (murine typhus), and 1/69 (1.4%) had leptospirosis [13].

Studies demonstrating an incidence of AKI associated with dengue ranging from 0.9% to 13.3% were included in Mallhi et al.'s [14] comprehensive review on the prevalence of AKI in dengue patients. Their research also showed that dengue-induced AKI is associated with significant morbidity and death, as well as extended hospital stays, which increase the burden on patients and the healthcare system. This might be explained by the potential for a secondary infection in the general population, which can lead to severe dengue, a recognized cause of AKI [15].

According to Omar et al., AKI was present in 41/767 (5.3%) dengue infections, 14/131 (10.7%) malaria infections, 11/106 (10.4%) influenza infections, 2/11 (18.2%) rickettsial infections, and 1/2 (50%) leptospirosis infections. The AKI group accounted for 15/48 (31.3%) of severe dengue cases, as defined by the WHO 2009 case definition. Of the 131 instances of malaria, 14 (10.7%) were in the AKI group; these included 4 cases of *Plasmodium vivax* (Pv) malaria and 10 cases of *Plasmodium falciparum* (Pf) malaria. Nine of the 11 influenza cases (10.4%) in the AKI group were influenza A, and two were influenza B. Finally, murine typhus was present in 2/2 (100%) of the rickettsial patients in the AKI group [13].

According to Omar et al., one patient did not improve, while 60/69 (86.9%) of the AKI patients recovered. Another case was sent to therapy for lung cancer. Hemodialysis was administered to 14/69 patients (20.3%) and inotropic medications (norepinephrine) to 13/69 patients (18.8%). Four out of fourteen patients (28.6%) were receiving intermittent hemodialysis, three out of fourteen (21.4%) were receiving sustained low-efficiency dialysis (SLED), and seven out of fourteen (50%) were receiving continuous renal replacement therapy (CRRT) [13]. Hemodialysis was given to 14 out of 100 patients in our research.

Conclusion

In tertiary care hospitals, acute kidney injury is frequently associated with acute febrile illness. The risk of acute kidney damage is higher in adults.

Among the most frequent causes of acute febrile illness are dengue, malaria, leptospirosis, and enteric fever. These individuals had a 40% incidence of AKI. According to this study, dengue is the most frequent cause of AFI and AKI. The highest burden of AKI is caused by leptospirosis, dengue, and malaria.

In order to help diagnose AKI early and provide appropriate care, we recommend that doctors look into kidney function in patients with acute febrile illness who also have certain risk factors.

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