



PREVALENCE AND MORTALITY ASSOCIATED WITH ACUTE KIDNEY INJURY AMONG CRITICALLY ILL PATIENTS ADMITTED TO INTENSIVE CARE UNIT (ICU)

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ABSTRACT

Introduction: Acute kidney injury is manifested by a rapid decline in renal function, usually with decreased urine output and resultant accumulation of end products of nitrogen metabolism. It is a common clinical problem encountered in critically ill patients, frequently in the setting of multiple organ failure, and is an independent risk factor for increased in-hospital and long-term mortality.¹

Aims: To identify the prevalence and mortality associated with AKI retrospectively and prospectively among critically ill patients admitted to the Intensive Care Unit (ICU).

Materials and methods: A retrospective and prospective observational study was conducted, in a tertiary care teaching hospital over a duration of 2 years (January 2020- December 2020 as retrospective) and (January 2021 to December 2021 a prospective observational study), with acceptance from institutional ethics committee (MGM/DCH/IEC/036/2021). Data of patients aged ≥ 18 years admitted during January 2020- December 2020 (retrospective data) were collected from the hospital records and January 2021-December 2021 (the data was collected by observational method). Patients with chronic kidney disease were excluded. Total Admission, Transfer in, Transfer out, DAMA, Discharge, Mortality due to AKI and AKI diagnosed were analysed using frequency and percentage.

Results: In a retrospective analysis, the overall yearly census was 5313 patients, and the prevalence of AKI was determined to be 4.53/1000 patients, and mortality associated with AKI was 133(11.38%) patients. In a prospective analysis, the overall yearly census of hospital admissions due to the covid pandemic was 4778 patients, and the frequency of AKI was found to be 7.95/1000 patients, with mortality associated with AKI being 18.73 percent, which was higher than in a retrospective study.

Conclusion: Due to covid-19 disease, the admission in prospective year was seen less but the prevalence and mortality associated with AKI are high than retrospective data.

Keywords: Acute Kidney Injury (AKI), Critically ill patients, Prevalence, Mortality, Intensive care unit (ICU), Risk factors.

INTRODUCTION

According to Kidney Disease Improving Globally Outcome (KDIGO) 2012 consensus, Acute kidney injury (AKI) is defined as increase in sr. creatinine by ≥ 0.3 mg/dl (≥ 26.5 μ mol/L) within 48 hours or increase in sr. creatinine to ≥ 1.5 times baseline or more within the last 7 days or urine output < 0.5 mL/Kg/hour for 6 hours. AKI is a life-threatening in which abnormalities in fluid, electrolyte, and acid-base balance necessitate the initiation of Renal Replacement Therapy (RRT).²

Risk for AKI is increased by exposure to the factors that cause AKI or the presence of factors that increase the susceptibility to AKI such factors like dehydration, genetic predisposition, acute or chronic comorbidities and use of nephrotoxic drugs. Patients having susceptible factors can be assessed to avoid or reduce the risk of AKI.²

Some of the studies which shows the risk factors among critically ill patients admitted in intensive care unit like Sandra L et.al., conducted a study to determine the risk for AKI in older adults and found that 69.2% were aged ≥ 55 years were at risk for developing AKI.³ Zabiuddin A et.al., conducted a retrospective study shows that age group between 60-69 years shows 25.2% prevalence of AKI with male preponderance of 72.7% and it was observed that 7.8% were overweight among admitted patients.⁴ Sampath Kumar et.al., conducted a study on risk factors associated with AKI in covid -19 patients found that Mean Age was 58 years (IQR 51-69) with a striking male predominance of 92%, Co morbidities seen were Diabetes in 73%, Hypertension 59%, Coronary Artery Disease in 32%, Fever with myalgia was 46%, Respiratory symptoms 59%, Oliguria 50% and Diarrhea 3% patients.⁵

In a retrospective study conducted by Michael et.al., in 155 critically ill patients found that common cause of AKI was sepsis with 39.3% and cardiac events 32%.⁶

Amayelle Rey et al. conducted cohort research to identify risk variables and drug-induced AKI in both the community and the hospital. The incidence of AKI was 28.6/1000 instances were drug-induced, with 40.4 % being community acquired-AKIs (CA-AKIs) and 59.6% being hospital acquired-AKIs (HA-AKIs). Antibiotics, diuretics, and contrast agents were significantly more likely to be involved in HA-AKIs, whereas antineoplastic, lipid-lowering drugs, antidiabetics, and immunosuppressive were significantly more likely to be involved in CA-AKIs.⁷

Acute kidney injury (AKI) is a usually dangerous condition that affects over 10 million people worldwide, and approximately 2 million patients die each year, with a 1.7- to 6.9-fold increased risk of progression to chronic kidney disease (CKD) and hospital death. To put this in context, AKI is now more prevalent than a heart attack.^{8,9} AKI is responsible for about one out of every five adult hospital hospitalizations. 5 AKI affects 60% of critically ill ICU patients, greatly raising morbidity and death rates.^{10,11}

A meta-analysis study conducted to estimate the worldwide incidence of AKI shows that the pooled incidence rate of AKI was 21.6% in adults and 33.7% in children. The pooled AKI-associated mortality rates were 23.9% in adults and 13.8% in children.¹² Eric A et.al. conducted a Study on global epidemiology that estimates the prevalence of AKI range from <1% to 66%.¹³ Li Yang conducted a study on AKI prevalence and clinical pattern in Asian countries shows that the pooled incidence of AKI in hospitalized patients reaches 20% globally.¹⁴

MATERIALS AND METHODS

A single centred retrospective and prospective observational study was undertaken in a tertiary care teaching hospital over a two-year period (January 2020- December 2020 as retrospective) and (January 2021 to December 2021 as prospective observational study). Ethical clearance was approved by Institutional Ethics Committee (MGM/DCH/IEC/036/2021). Data from hospital records were collected on individuals over the age of 18 who were admitted between January 2020 to December 2020 (retrospective data) and January 2021 to December 2021 (prospective data). Patients with chronic renal disease were not eligible. Total admission, transfer in, transfer out, DAMA, discharge, mortality due to AKI, and AKI diagnosed were all analysed using frequency and percentage.

STATISTICAL ANALYSIS

Data analysis was performed using statistical software SPSS (version 27.0) and frequency and percentage was used for analysis.

RESULT AND DISCUSSION

1. Analysis according to distribution of yearly patients census departmental wise in Retrospective and Prospective data.
2. Comparison of mortality between retrospective and prospective data

1. Analysis according to distribution of yearly patients census departmental wise in Retrospective and Prospective data.

The distribution of yearly patients Census Departmental Wise during the year January 2020 to December 2020 (Retrospective) table shows that the total admission of patients to ICU were 2510, transfer in from various departments to ICU were 2803, transfer out from ICU to inter-departments within the hospital were 3261, direct discharge and DAMA from ICU were 479 and 309 respectively, Total mortality were 1168 from which Mortality due to AKI were 133, Mortality without AKI were 1035 and AKI diagnosed were 241 patients (Table 1).

The distribution of yearly patient Census Departmental Wise during the year January 2021 to December 2021 (Prospective) table demonstrates that total admission to ICU were 3286 patients, transfer in from various wards to ICU were 1492, transfer out to various departments from ICU were 2344, direct discharge and DAMA were

615 and 247 respectively, Total mortality were 1404, Mortality due to AKI were 263, Mortality without AKI were 1141 and AKI diagnosed were 380 patients (Table 2).

The comparison of patient yearly census retrospective 2020 and prospective 2021, table illustrates that majority of total admission, Discharge and total mortality were significant greater in prospective data than retrospective was 3286 patients with 68.77%, 615 patients with 12.87% and 1404 patients with 29.38% respectively. And total transfer in, transfer out, and DAMA for retrospective were consider to be greater than prospective was 2803 patients with 57.75%, 3261 patients with 61.37% and 309 patients with 5.81%. (Table 3)

The prevalence is calculated by collecting the data of the 2020 and 2021 yearly census. The overall total admission seen in retrospective were consider greater than prospective was 5313 and 4778 respectively. Majority of AKI diagnosed in a year 2021 were noticed to be highest among critically ill patients were 380 patients with 7.95% (80/1000 cases) and 241 patients with 4.53% (45/1000 cases) were in 2020. (Figure 1). In similarity with other study, Zabiuddin A et.al., conducted a study in southern India shows the prevalence of AKI was found to be 8.36/1000 cases.⁴ Antonio J et.al., conducted a prospective study on epidemiology of AKI in Brazilian patients admitted in Intensive care unit with duration of one year shows the incidence of AKI was 21.3%.¹⁵

2. Comparison of mortality between retrospective and prospective data

From the present study, overall mortality of retrospective data shows 21.9% whereas majority of overall mortality is seen in prospective data was 29.38%. Though the total admission in 2021 census shows lesser in number than 2020 but Majority of mortality due to AKI was seen in prospective data was 18.73% as compared to retrospective data shows 11.38% due to covid-19 pandemic. Abinet A et.al., conducted a study on mortality in hospital shows that the in-hospital mortality is 12.8%.¹⁶

Majority of mortality without AKI was found in retrospective analysis was 88.61% as compared to prospective analysis was 81.26%. Ashraf O et.al conducted a single center study in Jordan was found that morality without AKI was 51.3% and mortality due to AKI was 58%.¹⁷

Shahid M et.al., conducted a study on mortality among patients admitted in ICU shows the mortality of AKI patients was 72.6% which is significantly higher than non-AKI patients 25.91%.¹⁸

Research Through Innovation

Table.1. Distribution of Yearly Patients Census Departmental Wise during the year January 2020 to December 2020 (Retrospective)

DEPARTMENTAL WISE PATIENT CENSUS FOR THE YEAR 2020							
ITEMS	EMS ICU	HDU	MICU	SICU	CVTS ICU	CVTS CCU	TOTAL
ADMISSION	863	1016	273	38	317	3	2510
TRANSFER IN	672	615	1197	131	164	24	2803
TRANSFER OUT	678	1070	1003	110	378	22	3261
DISCHARGE	61	329	25	14	50	0	479
DAMA	39	59	168	17	26	0	309
TOTAL MORTALITY	787	43	288	18	27	5	1168
MORTALITY DUE TO AKI	104	4	23	0	2	0	133
MORTALITY WITHOUT AKI	683	39	265	18	25	5	1035
AKI DIAGNOSED	120	26	80	3	7	5	241

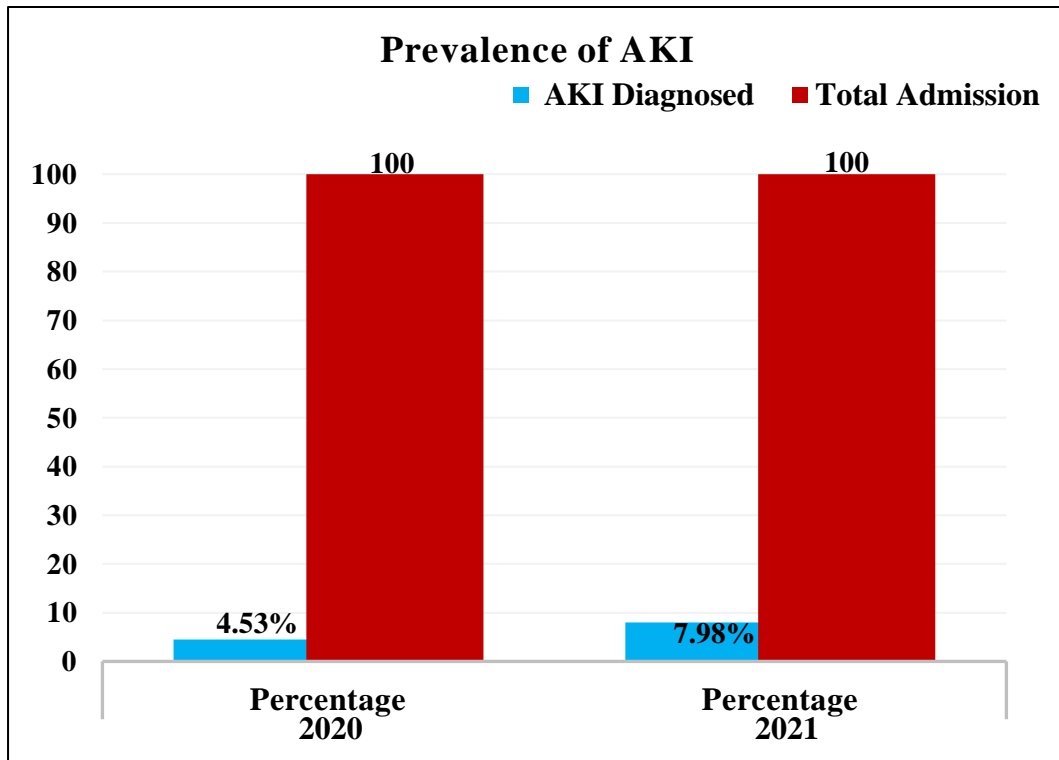
Table.2. Distribution of Yearly Patients Census Departmental Wise during the year January 2021 to December 2021 (Prospective)

DEPARTMENTAL WISE PATIENT CENSUS FOR THE YEAR 2021							
ITEMS	EMS ICU	HDU	MICU	SICU	CVTS ICU	CVTS CCU	TOTAL
ADMISSION	745	1015	754	403	1	368	3286
TRANSFERN IN	367	291	468	192	43	131	1492
TRANSFER OUT	403	474	784	428	28	227	2344
DISCHARGE	89	276	22	36	13	179	615
DAMA	29	75	69	41	0	33	247

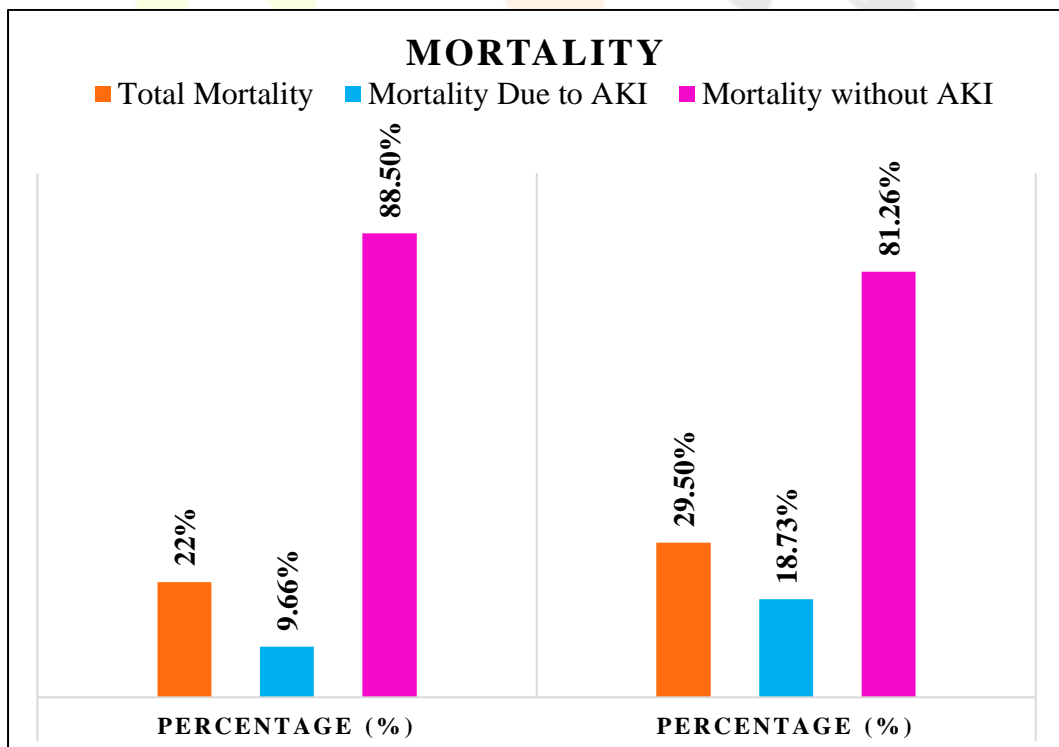
TOTAL MORTALITY	583	380	338	69	5	29	1404
MORTALITY DUE TO AKI	160	58	38	2	0	5	263
MORTALITY WITHOUT AKI	423	322	300	67	5	24	1141
AKI DIAGNOSED	185	77	80	18	4	16	380

Table.3. Comparison of retrospective and prospective yearly patient census

YEARLY PATIENT CENSUS OF 2020 AND 2021 DATA				
ITEMS	RETROSPECTIVE 2020		PROSPECTIVE 2021	
	FREQUENCY (f)	PERCENTAGE (%)	FREQUENCY (f)	PERCENTAGE (%)
ADMISSION	2510	47.24%	3286	68.77%
TRANSFER IN	2803	57.75%	1492	31.22%
TRANSFER OUT	3261	61.37%	2344	49%
DISCHARGE	479	9%	615	12.87%
DAMA	309	5.81%	247	5.16%
TOTAL MORTALITY	1168	21.9%	1401	29.38%

Figure 1. Comparison of mortality between retrospective and prospective data

2. Comparison of mortality between retrospective and prospective data

Figure 2. Comparison of mortality between retrospective and prospective data

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