

Clinical profile of Acute Kidney Injury in the elderly and its impact on functional capacity

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Abstract

Background: This study is a prospective cross-sectional study conducted among the geriatric population above 60 years of age admitted in the hospital

Aims: To assess the prevalence, etiology, risk factors, and outcomes of AKI in the elderly population and evaluate their functional capacity.

Methods: The following data, like demographic details, thorough medical history, details of co-morbidities, detailed Drug history, investigations, prognostic factors, and outcomes, were recorded in the proforma. In addition, the functional capacity of the elderly AKI patients was assessed using standardized WHO scales.

Results: The mean age of our study population was 66 years, with the majority being in the age group between 60-69 years; the male population were predominant in this study. Sepsis was the most common etiology accounting for 75% of elderly AKI patients, followed by obstructive nephropathy and drug-induced AKI. The co-morbidities present in the AKI patients were Diabetes mellitus, hypertension, and ischemic heart disease, and some patients had multiple co-morbidities. RIFLE criteria were used as staging criteria and outcome criteria for AKI. Patients falling under the 'L' criteria had a higher mortality rate. There was no significant change in mortality rate between people who underwent renal replacement therapy and those who did not. Volume overload was the most common risk factor for dialysis requirement, followed by refractory acidosis and hyperkalemia. In our study, the reduction in ADL&IADL scores signifies that after acquiring AKI, patients have reduced their day-to-day functions, and their dependence on others has increased.

Conclusion: AKI in the elderly presents with varied manifestations. Apart from pre-renal and post-renal causes, Sepsis accounts for most AKI patients in the elderly, especially in a developing country like India. Hence awareness has to be made regarding immunization practices among the elderly. Drug-induced AKI should be prevented by bringing awareness regarding polypharmacy among healthcare professionals and the elderly.

Keywords: Elderly AKI, RIFLE, Sepsis, ADL, IADL

Introduction

As the world's population is aging, there is a great emphasis on the well-being and healthcare issues of the elderly^[1]. Acute kidney injury (AKI) is a frequently encountered complication in the elderly. It is known to increase mortality and morbidity rates which may ultimately lead to a more extended hospital stay^[2]. AKI is also known to progress quickly to chronic kidney disease (CKD) in this group of patients. AKI is also costly for the elderly to handle in terms of financial burden (need for ICU, dialysis), functional capacity reduction, and increased dependence on others. The elderly population poses different diagnostic and therapeutic challenges due to their age-associated

structural and functional changes in the kidney and low functional renal reserve^[3]. This is further complicated by coexisting illnesses such as diabetes and hypertension. In addition, contrast agents and the use of nephrotoxic drugs are associated with an increased risk of AKI in elderly patients^[4]. This study apart from analyzing the clinical outcomes of AKI patients, it also studies the decline in functional capacity among elderly AKI patients and their increased level of dependency on care-takers, Hence this study was undertaken.

Materials and Methods:

This prospective cross-sectional study was

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conducted in the tertiary care hospital Shri B M PATIL Medical college hospital and RC in North Karnataka from June 2022 to February 2023. The sample size was calculated with the help of a statistician and kept to 100 patients. Elderly patients above the age of 60 who were satisfying the RIFLE (Risk, Injury, Failure, Loss, End-stage) during admission to the hospital and patient who were already admitted for medical or surgical management and developed acute kidney injury during their admission period were included in this study. The following data, like demographic details, thorough medical history, details of comorbidities, detailed drug history, investigations, prognostic factors, and outcomes, were recorded in the proforma and later analysed their association with acute kidney injury. The functional capacity of the elderly AKI patients was assessed using the WHO standardized scales like the Katz Index of Independence in Activities of Daily Living scale (ADL) and The Lawton Instrumental Activities of Daily Living Scale (IADL) scales and assessed how the disease condition increased the level of dependency of patients on care-takers. Patients who fulfilled RIFLE criteria within 48 h of admission were classified as community-acquired AKI, and patients who developed AKI later were classified as hospital-acquired AKI. The RIFLE criteria were determined based either on the urine output criteria or an increase in serum creatinine from its baseline. Statistical analysis was done using Statistical Package for the Social Sciences software. $P < 0.05$ was considered statistically significant.

Results

During the nine-month study period, a hundred patients enrolled in the study who satisfied the inclusion criteria. The mean age of our study population was 66.3, with a majority being in the age group between 60-69 years. The male population (64%) was more predominant in number than the female population (34%). The aetiologies that led the patients to acquire acute kidney injury are shown in Table 1.1.

TABLE 1.1 Aetiologies of acute kidney injury

ETIOLOGY		No. of patients (n=100)
PRE-RENAL	Congestive cardiac failure	18
INTRINSIC	Sepsis/Infection, including Pneumonia, Urosepsis	50
	Drug-induced AKI	16
POST-RENAL	Obstructive nephropathy	20

*Some patients had more than one etiology

Acute kidney injury was more prevalent in patients with comorbidities; among the AKI patients, 68% had Diabetes mellitus, 52% had hypertension, and 20% had old IHD. The mortality rate was hundred percent in the patient presenting at end stage (E), shown in Table

TABLE 1.2 RIFLE Classification and In-class Mortality

RIFLE class	No. of the patient (n=100)	No. of patients' death	In-class mortality rate (%)	p-value
Risk	16	2	12.5%	.09025
Injury	56	6	10.71%	
Failure	18	10	55.6%	
Loss	8	6	75%	
End-stage	2	2	100%	

1.2;

Refractory acidosis is the most common risk factor seen in our study for dialysis requirement, followed by Volume overload, refractory hyperkalemia, RIFLE (F) table 1.3.

TABLE 1.3 Risk factors for dialysis requirement

Risk factors*	No. of patients (n=100)
Refractory acidosis	26
Volume overload	22
Refractory hyperkalaemia	18
RIFLE "F"	18

*Some patients had more than one risk factors

Renal replacement therapy includes procedures like Haemodialysis, Peritoneal dialysis, and renal transplantation surgery. In our study, 42 patients underwent haemodialysis, and the mortality rate was comparatively lesser in this population compared to patients who needed.

TABLE 1.4 Effectiveness of RRT and in - group mortality

Group	No. of patients (n=100)	No. of patient deaths	In-group mortality (%)	p-value	
RRT	42	8	19%	0.039821	
Did not undergo RRT (n=58)	RRT needed	28	18		64%
	RRT not needed	30	2		6.67%

RRT but refused to undergo table 1.4.

In our study, patients with co-morbidities like diabetes mellitus and hypertension had prolonged hospital stays. The increase in the number of patient's dependency is shown in fig 2.1

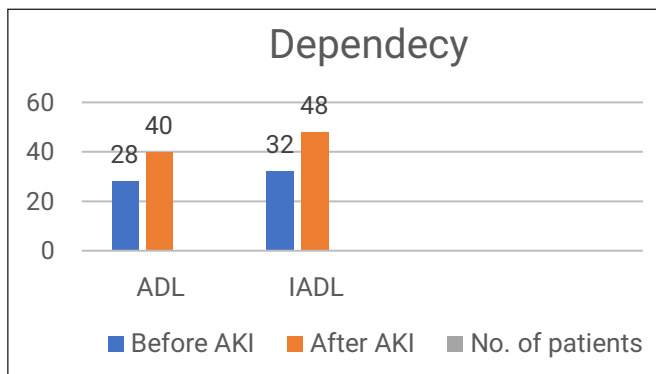


Fig 2.1 ADL & IADL assessment figure to detect an increase of dependent patients after AKI

Discussion

The incidence of AKI rose progressively after 60 years, and the male population was more predominant than females. In previous studies involving this age group, the intrinsic causes were more prevalent than pre- and post-renal causes, similar to our research. Our study found that Sepsis was the most common cause of AKI; similar results were observed in a survey by Eswarappa et al^[3]. This is because of the lack of immunization practices in our elderly population, especially against pneumonia.

Various Factors may lead to Sepsis, like uncontrolled type-2 Diabetes mellitus, untreated Urinary incontinence leading to urosepsis, Pneumonia, and Bedsores are more common among the elderly. Hence the elderly must be informed by creating awareness regarding these conditions and advised to approach the hospital at the earliest to avoid mortal outcomes like acute kidney injury^[4]. Awareness regarding 'immunization' plays a vital role at this time, preventing the elderly from acquiring severe infections, prolonged hospital stays, and increased medical expenses.

The elderly population is more vulnerable to drug-induced AKI^[5], mainly because of exposure to multiple medications and radiocontrast agents. Still, the incidence (16%) was low in our study compared to a survey done by Rosner et al., which had 18%. Educating the pharmacological aspect of drugs and radiocontrast dyes, which are more prone to cause acute kidney injury, must be emphasized in training medical students so that the incidence of drug-induced AKI can be reduced. Say 'No to Polypharmacy' core geriatrics concept must be made aware among all medical fraternities^[6], which will help us overcome many drug-induced iatrogenic events in the elderly.

Pre-existing co-morbidities like diabetes and hypertension significantly affect the incidence and outcome of geriatric AKI^[7]. Hence Diabetic and

Hypertensive patients should be routinely screened for kidney function tests. Our study found that diabetes patients had a more extended hospital stay and required more dialysis than non-diabetic patients. In a survey by Coca et al.,^[4] patients with hypertension had a more extended hospital stay.

RIFLE criteria were used as staging and outcome criteria for AKI patients. In our study, many patients presented to the hospital with the "I" stage of RIFLE, and in-hospital mortality was the least among them, like a study published by Rosner et al^[5]. Out of 100 individuals, 42 underwent renal replacement therapy, and the mortality rate was comparatively less among the individuals who experienced it than those who did not. Hence patients requiring RRT should be encouraged and motivated to undergo therapy to improve their quality of life.

In our study, Refractory acidosis was the most common risk factor for dialysis requirement, followed by Volume overload and hyperkalaemia, in a survey by Yokota et al^[7]. In 2018. The ADL & IADL signifies that after acquiring AKI, patients have reduced their day-to-day functions, and their dependence on others has increased. In a world lacking caretakers, AKI is a costly concern for individuals to get at age 60 and above by means of human support and financial support.

Conclusion

A longitudinal study must be performed to know how the functional capacity improved in patients after treatment of acute kidney injury. AKI in the elderly presents with varied manifestations. Apart from pre-renal and post-renal causes, Sepsis accounts for most AKI patients in the elderly, especially in a developing country like India. Hence, awareness must be made regarding immunization practices among the elderly. Early recognition, prompt treatment, and dietary management are essential for successful outcomes and must be followed to improve the quality of life in the elderly.

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