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Aetiology and Outcome of Acute Kidney Injury Patients at the Nephrology Unit of Pak Emirates Military Hospital Rawalpindi

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ABSTRACT

Objective: To assess the aetiology and outcome of patients admitted with acute kidney injury at the Nephrology Unit of Pak Emirates Military Hospital (PEMH).

Study Design: Cross-sectional analytical study.

Place and Duration of Study: Nephrology Unit, Pak Emirates Military Hospital, Rawalpindi Pakistan, from Jun 2019 to Jun 2020.

Methodology: Patients admitted with AKI were included in the study. The Kidney Disease: Improving Global Outcomes (KDIGO) clinical practice guidelines were used to diagnose acute renal injury based on creatinine level or urine output.

Results: A total of 300 patients were admitted to the Nephrology Unit with AKI during the study period. Sepsis was the commonest aetiology for acute kidney injury among the target population, followed by injury. 155(51.4%) patients were discharged, 53(17.7%) were stable in the ward, 70(23.4%) patients were shifted to the Critical Care Unit, and 22(7.3%) died. Long duration of hospital stay and the presence of multiorgan failure had a statistically significant relationship with poor outcomes in our study.

Conclusion: This study gives an insight into the aetiology and outcome of acute kidney injury among acute kidney injury patients admitted to the nephrology ward. Sepsis and injury were the commonest causes affecting renal function. Most of the patients had a good outcome. Patients with long hospital stays and multiorgan failure should be given special attention as they were more at risk of poor outcomes in our study.

Keywords: Acute kidney injury, Multiorgan failure outcome, Sepsis.

How to Cite This Article: *Ali A, Khan MNA, Ali I, Hussain MZ, Khan MS, Sajid Y. Aetiology and Outcome of Acute Kidney Injury Patients at the Nephrology Unit of Pak Emirats Military Hospital Rawalpindi. Pak Armed Forces Med J 2022; 72(6): 2025-2028. DOI: https://doi.org/10.51253/pafmj.v72i6.4713*

INTRODUCTION

Patients presenting with acute kidney injury (AKI) usually need management with renal replacement modalities, which are highly expensive and dependent on trained staff.[1,2] These replacement options are the only option to save the life of the patient in most cases. It has been estimated in several recent studies that almost half of the patients with renal diseases may require replacement therapies.[3,4] Procedure of renal replacement therapies have adverse effects & may have serious consequences for patient.[5-7]

AKI is common in hospitalized adults in India and leads to significant in-hospital mortality.[8] Priyamwda et al. in the same year, concluded that the 30-day mortality in AKI patients was around 50%. No significant difference in mortality was found among the community or hospital-acquired cases. Mortality was also independent of the stage of kidney injury.[9] Hoste *et al.* conducted a multi-centre study in Belgium regarding AKI. They concluded that almost half of the patients admitted to the ICU have an acute renal injury of any stage, which significantly increases their mortality. Mortality depends upon the renal function or the stage of AK.[10]

AKI becomes important for a developing nation like ours. If we could prevent the etiological causes or detect the injury early, it would reduce the cost of treatment but also minimize the disability time of the patient. Therefore, this study intends to assess the aetiology and outcome of patients admitted with acute kidney injury in the Pak Emirates Military Hospital (PEMH) Nephrology Unit.

METHODOLOGY

This cross-sectional analytical study was conducted at the Nephrology Unit of the Pak Emirates military Hospital, Rawalpindi Pakistan, from June 2019 to June 2020. The sample size was calculated by WHO Sample Size Calculator using the prevalence of AKI as.15.1%.[11] Ethical approval (Letter no: A/28/EC/91/148) from the Ethical Review Board Committee was taken. Non-probability consecutive sampling technique was used to gather the sample.

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Received: 03 Jul 2020; revision received: 15 Jul 2020; accepted: 28 Jul 2020

Inclusion Criteria: Patients of either gender, aged 20 to 60 years, admitted to the Nephrology Unit with a diagnosis of acute kidney injury were included in the study.

Exclusion Criteria: Patients with already established chronic kidney disease, those on dialysis, or those who had transplanted kidneys, pregnant women or patients with GCS less than eight were excluded from the study.

Written informed consent from the potential participants or their caregivers was obtained before the start of the study. The diagnosis of acute kidney injury was made by a consultant nephrologist on The Kidney Disease: Improving Global Outcomes (KDIGO) clinical practice guidelines as any of the following: increase in serum creatinine by ≥0.3mg/dL within 48 hour; or increase in serum creatinine to ≥1.5 times baseline, which is known or presumed to have occurred within the previous seven days; or urine volume <0.5mL/kg/h for six hours.[12,13] Relationship of factors like age, gender, presence of multiorgan failure, presence of injury and length of stay in the ward were correlated with the recovery of patients. We especially included the parameter of injury as the sample was drawn from the military setting. The good outcome included the patient being discharged from the ward after one week or staying inward with all parameters stable. The poor outcome included shifting to ICU/HDU or the death of the patient.

All statistical analysis was performed using Statistics Package for Social Sciences version 24.0 (SPSS-24.0). Characteristics of participants and the distribution of the outcome were described by using descriptive statistics. Participants were resulted by categorically compared by presence and absence of good outcomes. Chi-square was used to determine between-group variances in categorical correlates. Differences between groups were considered significant if *p*-values were less than or equal to 0.05.

RESULTS

Three hundred nine patients were initially approached to get them included in the analysis. Unfortunately, six were out of the age bracket of inclusion criteria, one had chronic kidney disease prior to admission in the Nephrology Ward, and caregivers of two patients did not consent to include them in the study as the patients were in an altered state of consciousness at the time of admission. Out of 300 patients, sepsis was the most commonest aetiology for AKI among the target population, followed by a injury (Table-I). The mean age of patients included in the study was 39.53±6.75. One hundred and fifty-five patients (51.6%) were discharged, 53(17.7%) were stable in the ward, 70(23.4%) were shifted to ICU/HDU, and 22(7.3%) died (Table-II). Long duration of hospital stay and presence of multiorgan failure had a statistically significant relationship (*p*-value<0.001 and 0.004, respectively) with poor outcomes in our study when the chi-square test was applied (Table-III).

Table-I: Underlying Etiology of Acute Kidney Injury in our Sample Population (n=300)

Underlying Causes	n(%)
Sepsis	117(39.0%)
Injury	67(22.3%)
Hypovolemia	38(12.7%)
Cardiac causes	30(10.0%)
Drug induced	28(9.3%)
Surgical causes	18(6.1%)
Others	02(0.6%)

Table-II: Outcome of Patients with Acute Kidney Injury in Nephrology Unit(n=300)

Total	Discharged	Stable in Ward	Shifted to High Dependency Unit/ Intensive Care Unit	Death
300	155(51.6%)	53(17.7%)	70(23.4%)	22(7.3%)

Table-III: Relationship of Factors with Outcome in Acute kidney Injury Patients (n=300)

Socio Demographic Factors	Good outcome (n=208) n (%)	Poor outcome (n=92) n (%)	*p*-value
Age			
35 year or less	79(37.9%)	29(31.5%)	0.280
35-60 years	129(62.1%)	63(68.5%)	
Gender			
Male	156(75.0%)	68(73.9%)	0.842
Female	52(25.0%)	24(26.1%)	
Duration of Hospital Stay			
< 1week	186(89.4%)	58(63.1%)	<0.001
1weekor more	22(10.6%)	34(36.9%)	
Injury			
No	162(77.9%)	71(77.2%)	0.892
Yes	46(22.1%)	21(22.8%)	
Multiorgan Failure			
No	186(89.4%)	70(76.1%)	0.004
Yes	22(10.6%)	22(23.8%)	

DISCUSSION

Hemodialysis has been used as a treatment modality for renal disease patients in routine clinical settings at tertiary care hospitals. The patient is usually transferred to the nephrology team for this purpose.[8,11,13] Evans *et al*. concluded that in the region of Malawi, more than ten person children who were admitted to the hospital have underlying kidney injuries and

infections, and malaria remains the leading cause of that presentation. Mortality and morbidity also remained high in that study.[14] Another study in this regard came up with the findings that acute pyelonephritis and renal injury secondary to snake bite are two important causes of AKI, increasing the mortality and morbidity associated with this illness.[15] We tried to generate the etiological factors commonly responsible for damaging this vital organ of body and outcome linked with it in our target population.

Sepsis was the most common etiological factor involved in the precipitation of AKI in our target population. Hoste *et al.* and Kaavya *et al.* in their studies showed similar findings, and sepsis was the commonest cause for AKI in their studies as well.[10,11] Second common cause was interesting and different in our analysis which has not been reported that frequently in past studies and that is injury. The study by Lai *et al*. revolving around injury patients is more relevant in this regard, highlighting the renal involvement and presence of renal injury among injured patients.[15] Reason for this finding in our study may be data collection from a military hospital. Results might differ if the study was conducted in a public or private hospital. The gender of the patients had no statistically significant relationship with the outcome in our analysis. Host *et al.* in 2015 generated similar results, and gender had no association with the outcome of renal injury in their study.[10]

Multiorgan failure is linked with poor outcomes in our study. Vikrant *et al*. and Kaaviya *et al*. had produced similar results, and failure of organs other than kidneys has made the situation worse and affected the prognosis inversely.[8,11] This is understandable in our setting as well as multiorgan failure becomes a definitive indication to shift the patient to intensive care unit which was classed under poor outcome in our study. Though ICU shifting and failing multiple organs increase mortality and morbidity, sophisticated studies with long-term follow-up of AKI patients in this regard may generate beneficial results.

The high mortality rate has been a problem for patients with renal injury worldwide. Yang *et al*. concluded that primary prevention is usually the key, and general physicians should be aware of this complication of injury. Patients suffering from injury should be considered at high risk of developing renal injury and prioritized for dialysis according to their needs.[16] Around 30 percent of the study participants had poor outcomes, and they were either shifted to ICU/HDU or died. Ghirmire *et al.* concluded that around half of the patients had expired during admission to the intensive care unit. Day 1 to 4 was the time when most of the patients expired. Pneumonia and sepsis were the common causes of AKI among these patients and were also predictors of mortality.[17] Bouchard *et al.* also generated similar findings.[18]

LIMITATIONS OF STUDY

Study design emerges as the main limitation of our analysis. The baseline renal function of the patients was not known, so that some patients may have compromised renal function before the injury.

CONCLUSION

The aetiology and outcome of acute kidney injury among the patients admitted to the nephrology ward have been reflected in this study. Sepsis and injury were the commonest causes affecting renal function. Most of the patients had a good outcome. Patients with long hospital stays and multiorgan failure should be given special attention as they were more at risk of poor outcomes in our study.

Conflict of Interest: None.

Author's Contribution

Following authors have made substantial contributions to the manuscript as under:

AA & MNAK: Conception, study design, drafting the manuscript, approval of the final version to be published.

IA & MZH: Data analysis, data interpretation, critical review, approval of the final version to be published.

MSK & YS: Data acquisition, critical review, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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