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The Effects Of Acute Kidney Injury On The Outcomes Of Patients With Gastrointestinal Bleeding

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Abstract

Objective: To determine the clinical outcomes of patients with acute kidney injury in patients with upper gastrointestinal bleeding (UGIB), as it is a very frequently encountered condition with high morbidity and treatment costs. We aimed to study the differences in clinical outcomes in patients with UGIB who developed acute kidney injury (AKI) and those who did not.
Methods: This cross-sectional study was conducted between Jan 1 and Jun 30, 2023, at a private hospital in Karachi. 200 cases with upper gastrointestinal bleeding were recruited by non-probability sampling after participant assent. 100 patients comprised the acute kidney injury (AKI group) and 100 patients were without AKI. Participants documented age, gender, and co-morbidities in a self-structured questionnaire. Clinical outcomes i.e. hypoalbuminemia, hospital stay and mortality were evaluated and compared.
Results: Mean age was 45.03±9.17 years in AKI group and 45.57±9.31 years in without AKI, p-value=0.680, albumin levels in AKI was 2.74±0.43 and without AKI 3.18±0.31, p-value=0.00, Hb level in AKI group was 9.07±0.83 and without AKI 9.54±1.04, p-value=0.001, mean hospital stay in AKI group was 5.21±1.00 and without AKI group 4.20±0.96 days, p-value=0.000. A comparison of the two groups regarding gender and clinical outcome shows that 58 (58%) in AKI and 56%(56) without AKI were male whereas 42 (42%) in AKI and 44 (44%) without AKI were females, mortality in AKI group was 27(27%) and in without AKI group 8(8%) cases, p-value=0.000.
Conclusion: We concluded that the rate of clinical outcome in terms of hospital stay, hypoalbuminemia and mortality was adverse in upper gastrointestinal bleeding with AKI than those without AKI.

Keywords: Acute kidney injury, gastrointestinal bleeding, clinical outcome.

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1. Introduction

Upper gastrointestinal bleeding is a very frequently encountered condition that has a high morbidity and treatment costs. It has been reported in the literature that AKI developed in 1-11.4% of patients with acute UGIB.[1] There are no recent studies in our country exploring this topic, and that is the objective of our study, so that AKI may be diagnosed and treated early in UGIB patients, to improve patient outcomes. Acute kidney injury (AKI) is a commonly encountered medical issue that is linked to elevated mortality rates, extended periods of hospitalization, and the potential development of chronic kidney disease (CKD).[2,3] The occurrence of acute kidney injury (AKI) exhibits variability based on the specific treatment environment and the criteria used for its classification. Acute kidney injury (AKI) manifests in around 10-15% of patients upon hospital admission, with its prevalence exceeding 50% in critical care units.[4-6]

The prevalence of acute kidney injury (AKI) has shown a progressive rise in recent years. This escalation may be attributed to several variables, including but not limited to the ageing population, the surge in underlying comorbidities that predispose individuals to AKI, the heightened utilisation of nephrotoxic substances, and the increased frequency of invasive medical operations.[6]

A dataset spanning 25 years in Pakistan, including 5,623 individuals diagnosed with Acute Kidney Injury (AKI), indicates that the mean age of the studied population was 37.74±14.89 (range 18-100) years. Of the total cases, 2,851 were identified as male and 2,772 as female, resulting in a male-to-female ratio of 1.02:1. Except those with acute kidney injury (AKI) as a result of obstetric factors, the male population accounted for 68% of the total population.[7] The aetiology of acute kidney injury (AKI) is often categorised into three broad classifications: prerenal, intrarenal, and postrenal. While this categorisation might be useful for establishing a differential diagnosis, it is important to note that acute kidney injury (AKI) is mostly complex, with similar pathophysiologic characteristics across the various groups.[8]

Patients with acute kidney injury (AKI) who need hemodialysis are at increased risk for gastrointestinal bleeding (GIB), as uremia negatively affects platelet aggregation. However, it is still uncertain how much of a financial burden GIB-related AKI hospitalisations pose in the United States (US), and not much data is available in Pakistan. Therefore, healthcare planners must have an accurate picture of the trends in AKI-related hospitalisations leading to upper GI bleed. Also, compared to single-centre and/or multi-centre research, a nationwide study would be more effective in identifying vulnerable populations and decreasing healthcare disparities.[9] Therefore, the objective of our study was to see the outcome of those patients who were admitted with acute upper GI bleed and developed acute kidney injury compared to those who did not.

2. Materials & Methods

This was a cross-sectional research, which took place between Jan 1 and Jun 30, 2023, in the high-dependency and intensive care units of a private hospital in Karachi. Ethical approval and informed consent from the participants were obtained.

Patients over the age of 18 of either gender who were diagnosed with UGIB were included in this analysis. These cases who presented to the emergency department with UGIB symptoms and were admitted to the critical care unit were included in the research. The patients who were excluded were those who were not candidates for upper GI endoscopy, who had been diagnosed with lower GI haemorrhage, who were not regular dialysis patients, who did not have a baseline creatinine level available, and who were less than 18 years old.

Data about the presence of comorbidities, symptoms observed upon admission, findings from endoscopic examinations, treatments performed during endoscopy, administration of blood products and their respective dosages, serum creatinine levels upon admission to the hospital, baseline creatinine levels, creatinine levels at discharge or time of death, glomerular filtration rate, haemoglobin levels, albumin levels, need for hemodialysis, and occurrence of recurrent bleeding were collected.

The creatinine levels, which were recorded at least three months before, were included in the analysis. These values were calculated using the average value of two measurements of serum creatinine levels. The baseline creatinine levels were used as reference values upon admission to the emergency department in cases where prior measurements of creatinine levels were unavailable. The stages of Acute Kidney Injury (AKI) were defined and documented based on the RIFLE classification. The present research included individuals who were diagnosed with acute kidney injury (AKI) and classified according to the RIFLE criteria into stages R, I, and F. Patients diagnosed with acute kidney injury (AKI) at RIFLE stages L and E were excluded from the research due to its retrospective nature [10]. These stages need a minimum duration of renal function deficits lasting more than 4 weeks and more than 3 months, respectively, for diagnosis.

The statistical analysis was conducted using the Statistical Package for the Social Sciences software (SPSS, version 21). The findings about numerical variables were presented in the form of mean ± standard deviation and median, whereas the results for categorical variables were stated in terms of numbers and percentages. Before conducting parametric tests, the data underwent analysis to assess the normality of their distribution and the homogeneity of variances. The t-test was used to assess the presence of a statistically significant difference between two independent groups, given that the data satisfied the assumptions necessary for parametric testing. The Chi-square test and Fisher's exact test were used to assess disparities in categorical variables among the various groups. A significance level of $p<0.05$ was deemed to be statistically significant.

3. Results

We compared to age in mean and sd in both groups, it shows as 45.03$\pm$9.17 years in the AKI group and 45.57$\pm$9.31 years in without AKI, p-value=0.680, albumin levels in AKI was 2.74$\pm$0.43 and without AKI 3.18$\pm$0.31, p-value=0.00, Hb levels in AKI group was 9.07$\pm$0.83 and without AKI 9.54$\pm$1.04, p-value=0.001, mean hospital stay in AKI group was 5.21$\pm$1.00 and in without AKI group 4.20$\pm$0.96 days, p-value=0.000

A comparison of two groups regarding gender and clinical outcome shows that 58(58%) in AKI and 56%(56) without AKI were male whereas 42(42%) in AKI and 44(44%) without AKI were females, p-value=0.443, mortality in AKI group was 27(27%) and in without AKI group 8(8%) cases, p-value=0.000.

According to our study, 35 out of 200 UGIB patients (17.5%) died. Infections, severe bleeding, and sudden cardiac arrest all contributed to patients' deaths, as did the resulting shock. Twenty-seven (77.14%) of these people had AKI, whereas eight (22.86%) were without AKI. Patients who did not have AKI had a mortality rate that was 8%.

Table 1: Comparison of two groups regarding age, laboratory findings and clinical outcome

	Group	N	Mean	Std. Deviation	P value
Age	AKI	100	45.03	9.17	0.680
	Without AKI	100	45.57	9.31	
Albumin Levels	AKI	100	2.74	0.43	0.00
	Without AKI	100	3.18	0.31	
Hb Levels	AKI	100	9.07	0.83	0.001
	Without AKI	100	9.54	1.04	
Hospital Stay	AKI	100	5.21	1.00	0.00
	Without AKI	100	4.20	0.96	

Table 2: Comparison of two groups regarding gender and clinical outcome

	Group		Frequency	%	P value
Gender	AKI	Male	58	58	0.443
	Without AKI		56	56	
	AKI	Female	42	42	
	Without AKI		44	44	
Mortality	AKI	Yes	27	27	0.000
	Without AKI		8	8	
	AKI	No	73	73	
	Without AKI		92	92	

4. Discussion

We compared the average and standard deviation of the ages of those with and without AKI, we found that the difference between the two groups was not statistically significant (p=0.680). Patients with UGIB who also had AKI tended to remain in the hospital longer, which is in line with previous research.[10] A longer hospital stay was associated with AKI (5.21+1.00 days vs. 4.20+0.96 days, p=0.00). Patients with AKI stayed in the hospital for substantially longer than those without AKI (p 0.001). AKI is a medical issue that places a heavy financial and time strain on hospitals and healthcare systems.

Patients with acute kidney injury had a statistically significant increased rate of developing hypoalbuminemia and increased mortality.[11] In a study by Alkhatib et al., the mean hospital stay was 2.7days and the mean hospital cost was 11,779$ in the patients with UGIB not developing AKI and the mean hospital stay was 5 days and the mean hospital cost was20,230$ in the patients with UGIB developing AKI.[12]

In a meta-analysis conducted in 2010,[13] it was shown that hypoalbuminemia serves as an autonomous risk factor in both the occurrence of acute kidney injury (AKI) and the mortality of patients afflicted with AKI. The association between hypoalbuminemia and higher rates of acute kidney injury (AKI) may be explained by the negative correlation of albumin with inflammation and its significant role in maintaining renal perfusion. In our investigation, it was shown that individuals with AKI had markedly reduced amounts of albumin in comparison to those without AKI. In a separate retrospective investigation,[14] it was shown that hypoalbuminemia serves as a prognostic indicator for increased death rates among individuals diagnosed with acute kidney injury (AKI). The development of hypoalbuminemia as an acute phase reactant may result from the degree of gastrointestinal bleeding, hence contributing to a diminished overall condition in patients. A recent Turkish study also showed longer lengths of hospital stay and higher mortality rates in patients with UGIB and AKI.[15] This was in line with a previous study UGIB is associated with a significantly increased risk of death and length of hospital stay and

both renal and extrarenal risk factors are associated with the occurrence of acute gastrointestinal haemorrhage.[16] Acute Kidney Injury (AKI) is a frequently seen clinical manifestation in patients who are admitted to hospitals and intensive care units (ICUs), and the effectiveness of its treatment does not consistently result in positive results. Nevertheless, it is possible to take measures to prevent it. AKI represents mortality from a main illness since it is not a primary disease but rather a complication of another disease.

It was shown that AKI in UGIB patients may be an excellent predictor of death. Having AKI also greatly increased the likelihood of being admitted to the ICU and the length of time spent there. We found a significantly greater risk of hypoalbuminemia in patients with UGIB. Hospitalisations for people with AKI are more expensive and take longer to recover from, placing a heavy load on healthcare systems.

5. Conclusion

This study showed that AKI in patients with UGIB could be a strong predictor of mortality. In addition, AKI significantly increased the duration of hospital stay and therefore, hospital costs. However, using the RIFLE criteria allows the description of kidney injury in its early stage and taking appropriate precautions can improve clinical outcomes in patients with UGIB developing AKI.

CONFLICTS OF INTEREST- None

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M.M, K.B, A.K - Conception of study
M.M, K.B, A.K - Experimentation/Study Conduction
M.M, K.B, A.K - Analysis/Interpretation/Discussion
M.M, K.B, A.K - Manuscript Writing
M.M, K.B, A.K - Critical Review
M.M, K.B, A.K - Facilitation and Material analysis

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