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Research Article

ACUTE KIDNEY INJURY: ITS ETIOLOGICAL FACTORS, CO-MORBIDITIES AND MORTALITY RISK

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Abstract:

AKI (Acute Kidney Injury) constitutes approximately 5-7% of hospital admissions and up to 30% of admissions to intensive care units. Large referrals to dialysis units suggest that the condition is more common in Pakistan. The study was conducted to identify the etiological factors, co-morbidities and mortality risk in AKI.

Place and Duration: In the Nephrology Department of Mardan Medical Complex, Mardan for one-year duration from March 2019 to March 2020.

Methods: We conducted prospective cross-sectional analysis in 624 adult patients with AKI. The mean age was 48.96±18.3 years. AKI was predominantly encountered in ICU (Intensive Care Unit) patients. Diabetes, hypertension, COPD (Chronic Obstructive Pulmonary Disease), coronary artery disease were the most commonly prevalent co-morbidities.

Results: Out of the 624 patients, 460 were admitted with medical causes (73.7%), 124 with obstetrical causes (19.8%) and 40 (6.4%) with surgical causes. Sepsis was the most common medical cause for AKI accounting for 138(30%) of patients. Among pregnancy related AKI majority had puerperal sepsis 65 (52.41%) followed by pregnancy induced hypertension in 30(24.1%). There was increased incidence of acute gastroenteritis and parasitic infections during rainy seasons. Hemodialysis was required in 80% (n=499) of patients. The mean duration of hospital stay was 9.41±7.3 days. Multi-organ failure was seen in 106 (16.98%) patients. Among them 60 (63.6%) patients were expired.

Conclusion: Our study highlights the AKI secondary to sepsis followed by pregnancy-related AKI was the most frequent etiological factors for AKI. Multi-organ failure, puerperal sepsis was accounted for the majority of mortality in AKI. AKI among these instances are largely preventable. The timely and aggressive management will certainly reduce the incidence of AKI.

Key keywords: Acute kidney damage, Sepsis, Multiorgan failure, AKI associated with pregnancy.

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INTRODUCTION:

Acute renal damage (AKI) is characterized by a rapid decrease in glomerular filtration rate (within a few hours or days), the retention of nitric transformation products and the deterioration of the volume of extracellular fluid, electrolyte and acid-based homeostasis¹⁻². AKI makes about 5% of hospital applications and up to 30% of its income in intensive care units. Determination of prevalence, etiological profile and AKI outcome, initiation of preventive and therapeutic strategies, timely identification of patients to avoid kidney replacement therapy (RRT) and comparison of epidemiological studies to improve clinical decision-making³⁻⁴. Geographical, etiological, cultural and economic differences determine the differences between AKI patterns in different parts of the world. Although reliable statistics on the prevalence of AKI are not available, dialysis unit referral statistics show that the situation is more common in India than in the West⁵⁻⁶. AKI may be the result of a reduction in renal infusion without cell damage, ischemia, toxic or obstructive insult to the renal tubule, interstitial process with inflammation and swelling, or primary reduction in the ability to filter glomeruli. Mortality in AKI patients is close to 50% and has changed little in the last 15 years. On the contrary, there is an increase in the incidence of AKI due to surgery and sepsis⁷⁻¹⁰. Therefore, it conducted a prospective study to look for the AKI pattern in Pakistani population.

MATERIALS AND METHODS:

This analysis was held in the Nephrology Department of Mardan Medical Complex, Mardan for one-year duration from March 2019 to March 2020. This study was held in All patients aged above 18 years with features of AKI as per AKIN (Acute Kidney Injury Network) criteria which is defined as an increase in serum creatinine of 0.3 mg/dl or more within 48 hours of observation or 1.5 times baseline or greater, which is known or presumed to have occurred within 7 days, or a reduction in urine volume below 0.5 ml/kg/h for 6 hours. Both inpatients and out patients were included in our study. Patients with pre-existing renal disease and those who received renal

transplantation were excluded from the study. A total of 624 patients met the above requirements and were evaluated prospectively. Renal biopsy was performed if a patient was oliguric or dialysis dependent at the end of 3 weeks. Laboratory studies of nitrogen anemia have been shown to be suitable for 624 patients with clinical signs. Informed consent was obtained. Demographic information was obtained, such as age, gender, weight, height, intensive care unit and hospital stay. The clinical data collected included the first diagnosis, the history of the disease, the presence of morbidity, the surgical condition, the results of physical examinations, laboratory tests, treatment history, hospital course and kidney replacement therapy (RRT). The primary and maximum concentration of serum creatinine, urine production has been documented. Data on laboratory studies were collected to verify the etiology of AKI, which includes full urine analysis, metabolic panel, lipid profile, blood culture, hematological profile, coagulation profile. Radiological examinations, serological tests and the results of kidney biopsy tests were undertaken at the time of their presence. Statistical calculations were performed using a square test when necessary. P was declared valid in 0.05. Calculations were made using the SPSS statistical software (statistical package for social sciences) 16.0.

RESULTS:

A total of 624 patients were studied. The mean age of these patients was 48.96-18.3 (range 18-85). The number of men was 385 (61.85%), out of 238 women (38.14%). Etiological factors include 460 medical causes (73.7%), 124 (19.8%) patients with obstetric causes and 40 (6.4%) patients with surgical reasons. (Bar scheme shown in 1) AKI, AKI associated with sepsis 138 (30%), obstetric AKI 124 (19.8%), acute gastroenteritis 71 (15.5%), drugs and induced toxin AKI 50 (11.03%) are medical reasons. Among NSAIDs drugs were aminoglycosides and herbal medicines. Parasitic infections 34 (7.6%) including malaria, leptospirosis, dengue fever and various AKI causes, including 61 (13.37%) heart, liver and AKI due to malignancies (Table 1).

Table 1 showing etiology of AKI

Etiology	Number of patients (N %)
Septicemia	138 (30%)
Acute gastroenteritis	71 (15.5%)
Drugs and Toxins	50 (11.03%)
Parasitic infections	34 (7.6)
Obstetric causes	124 (19.8%)
Surgical causes	40 (6.4%)
Miscellaneous	61 (13.37%)

The average length of stay in the hospital ranged from 9.41 to 7.3 days to 1-34 days. Of the 624 patients, 181 (29.0%) concomitant diseases. Diabetes in 65 (10.42%), hypertension in 46 (7.5%), COPD (6.4%) 40 30 (4.8%). (Table 2) The majority of patients with AKI surgery had postoperative AKI and cellulite, most of them 20 (50%) from which kidney stone disease, which caused observed congestion. Postpartum sepsis is 65 (52.41%) and 30 (24.1%) hypertension associated with pregnancy. Postpartum bleeding was observed in twelve (9.67%) patients, 7 (5.64%) prenatal and different causes 7 (5.6%).

Table 2 showing co-morbid conditions

Co-morbid Conditions	Number of patients (N%)
Diabetes Mellitus	65 (10.42%)
Hypertension	46 (7.5%)
COPD	40 (6.4%)
Coronary artery disease	30 (4.8%)

The increase in acute gastroenteritis increased during the summer months, while sepsis and parasitic infections were very high in the rainy season. Of the 624 patients, 71 received a kidney biopsy. Acute tubular necrosis (ATN) in 30 (38.96%), acute interstitial necrosis (AIN) 15 (19.48%), ATN and AIN 8 (10.52%), acute cortical necrosis 12 % (15.78%) and hemolytic syndrome 12 (15.78%) Patients. (Table 3) 80% of patients needed hemodialysis. On average, each HD patient received 2.5 x 1.5 (range 1-14) of HD sessions. Patients. 60 (63,6%) patients have expired. To maintain hemodynamic stability, 134 patients needed the support of a feud. 29 (40%) died within 48 hours of adoption. Only 5(3.73%) mortality in patients who do not receive vasopressor support (p.05).

Table 3 showing renal biopsy findings

Histopathology	Number of patients (N%)
Acute tubular necrosis (ATN)	30 (38.96%)
Acute interstitial nephritis (AIN)	15 (19.48%)
ATN + AIN	8 (10.52%)
Acute cortical necrosis	12 (15.78%)
Hemolytic uremic syndrome	12 (15.78%)

DISCUSSION

The cause of AKI was multifactorial. This study showed that our age group of patients is younger a decade in the west, but most of them are comparable to Pakistani studies. Medical reasons contributed to 73.7% of AKI, 6.4% for surgical reasons and 19.8% of patients in total obstetrics. In a study conducted by Jayakumar et al in southern India, 87.6% of AKI were found in medical patients, 8.9% and 3.4% in surgical and obstetric patients¹¹⁻¹². In our study, a low percentage of AKI in surgical patients can be attributed to the inability of surgical knowledge in our institute, as well as not open heart and pancreatic surgery¹³⁻¹⁴. The most common medical cause of AKI is sepsis, which accounts for 30%, a study from Pakistan showed 33.6% due to AKI sepsis. In the group of acute gastroenteritis and parasitic infections, peak was observed in the rainy season (June-September) in 22.2% of patients. The hypothesis of abundant precipitation leads to soil erosion, leaching of minerals and organic compounds, leaching and cutting of water, conditions conducive to the survival of organisms that cause or infect infectious diseases such as leptospirosis, dengue fever and malaria. In this study, patients with NSAIDs and herbal medicines responsible for the development of drugs and toxins 50 (11.03%) were guilty. In India, Thatte et al. secondary to the use of

aminoalkylated. Obstructive uropathy is an important cause of surgical AKI in some tropical regions. This study shows kidney disease, which causes 20 (50%) Obstruction. postoperative AKI and cellulitis¹⁵. Advances in maternity care led to a 22% drop in AKI in 1960 to 8% in 1960. However, this scenario remains unchanged in developing countries. In the current study of most AKI-related pregnancy, 45.4%) subsequent pregnancy-induced hypertension (23.2%). The average duration of stay in the hospital was 9.4 days. Hemodialysis was required in 80% of patients, but 80% of patients with high normal kidney function also fully recovered. Overall mortality was 9.61%. Mortality was as high as in other studies with multiorgan failure. Mortality was high for medical reasons compared to AKI patients for surgical and obstetric reasons in patients. A possible explanation for lower mortality in surgical and obstetric patients is the lack of patients with significant multiorgan deficiency, which is common in patients with medical AKI. There was no significant statistical difference in age and gender mortality in the study population. The presence of hypotension was associated with significant mortality. Hypotension was observed unfavorable prognosis in AKI. Mortality was high in patients who needed vasopressive support and patients who needed dialysis treatment. Vasopressive support and

dialysis support in AKI patients are considered a predictive factor for the outcome. Severe metabolic acidosis and hyperkalemia were associated with an adverse outcome. In this study, a high mortality rate consisting of previous studies was established in patients who also present septic shock patients in need of vasopressors.

CONCLUSION:

This is the most common etiological factor for AKI due to sepsis and then AKI due to pregnancy. Multi-organ failure, postpartum sepsis, hypotension during reporting account for the majority of AKI mortality. Among these cases can largely prevent AKI. Timely and aggressive management will certainly reduce incident of AKI.

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