Original Research Article

Incidence and outcome of acute kidney injury in type 2 diabetes patients in a tertiary care hospital- A prospective study

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Abstract

Introduction: Acute kidney injury (AKI) is currently defined by the Kidney Diseases: Improving Global Outcomes (KDIGO) clinical practice guidelines workgroup as a rise of serum creatinine at least 0.3mg/dl from baseline within 48 hours or at least 50% higher from baseline within one week or a reduction in urine output to less than 0.5ml/kg per hour for longer than 6 hours (KDIGO, 2012). **Materials and Methods:** A prospective study was conducted on Type 2 diabetic patients with acute kidney injury irrespective of age and gender at Department of General Medicine, Shri Sathya Sai Medical College and Research Institute, Chennai, Tamilnadu from January 2019 to December 2019 (1 year). Type 2 diabetic patients 30 years or above, irrespective of gender, diagnosed to have acute kidney injury using KDIGO criteria, admitted o ICU or wards under the Department of General Medicine, Shri Sathya Sai Medical College and Research Institute, Chennai, Tamilnadu. **Results:** The study was conducted in a total of 75 diabetic patients who developed acute kidney injury. There were 47 males and 28 females. The aetiology and outcome of acute kidney injury in the above patients were found out. Blood urea, serum creatinine, serum electrolytes, fasting and post-prandial blood sugar, WBC count, platelet count and haemoglobin were included as the baseline parameters. **Conclusion:** Infection was the most common cause of AKI in Type 2diabetes patients in our study. Among drug induced renal failure patients, NSAIDS were noted to be most common cause. Age >60 and male gender were prevalent in the majority of AKI patients. About 52.66% of the total patients recovered to normal renal function, 13.3% recovered partially, with 14% of the total patients progressed for maintenance hemodialysis. Crude mortality rate among patients with AKI in the study group was 20%.

Key Words: Acute kidney injury, NSAIDS, hemodialysis, haemoglobin.

Introduction

Acute kidney injury (AKI) is currently defined by the Kidney Diseases: Improving Global Outcomes (KDIGO) clinical practice guidelines workgroup as a rise of serum creatinine at least 0.3mg/dl from baseline within 48 hours or at least 50% higher from baseline within one week or a reduction in urine output to less than 0.5ml/kg per hour for longer than 6 hours (KDIGO, 2012)[1]. Causes of AKI can be categorized into pre-renal, renal and post-renal. The pre-renal causes include factors which lead to reduced renal blood flow, commonly hypovolemia and decreased effective circulatory volume due to congestive cardiac failure[2]. Post-renal causes include obstruction of the urinary tract. AKI can also be superimposed on underlying kidney diseases which involve glomeruli, tubules, interstitium or blood vessels. Sepsis is a common cause of AKI in developing countries as is drug-induced AKI (Lameire, 2013)[3]. Acute kidney injury is usually diagnosed based on clinical history, blood investigations and urinary findings. Kidney biopsy is done when pre-renal and post renal causes have been excluded and intrinsic causes of AKI are suspected[4].

The development and progression of CKD involves risk factors such as decreased nephron count at birth, nephron loss due to ageing, acute and chronic exposure to noxious substance or illness such as type 2 diabetes and obesity. CKD is greatly associated with hypertension and diabetes in developed countries. But in developing countries the main cause of CKD is communicable diseases, toxins from environment and other causes are unknown[5].

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The incidence and prevalence of diabetes mellitus (DM) have continuously been increased over the last 20 years. Meanwhile an estimated number of 387 million people worldwide suffer from DM. Morbidity and mortality of diabetic patients are substantially aggravated by cardiovascular complications including coronary artery, cerebrovascular, and peripheral artery disease. In addition, DM may significantly affect kidneys and urinary tract. The disease accounts for most cases of end-stage renal disease in Western-Europe and in the US[6].

The main objective of the study to study the incidence and outcome of acute kidney injury in patients with type 2 diabetes in Shri Sathya Sai Medical College and Research Institute, Chennai, Tamilnadu.

Materials and methods

A prospective study was conducted on Type 2 diabetic patients with acute kidney injury irrespective of age and gender at Department of General Medicine, Shri Sathya Sai Medical College and Research Institute, Chennai, Tamilnadu from January 2019 to December 2019 (1 year).

Inclusion criteria

Type 2 diabetic patients 30 years or above, irrespective of gender, diagnosed to have acute kidney injury using KDIGO criteria, admitted o ICU or wards under the Department of General Medicine, Shri Sathya Sai Medical College and Research Institute, Chennai, Tamilnadu.

Exclusion Criteria

Patients with preexisting renal disease and those who received renal transplantation. Type 2 diabetic patients admitted in the ICU and wards under Medicine and Nephrology department, Shri Sathya Sai Medical College and Research Institute, Chennai, Tamilnadu were

evaluated in detail after taking prior consent. Evaluation includes detailed history taking and physical examination. Acute kidney injury will be assessed on the basis of their serum creatinine and/or urine output fulfilling the KDIGO criteria.

Statistical Analysis

Results were presented as frequency and percentages for Categorical variables and mean +/-SD for continuous variables. Statistical calculations were done using Chi-square tests for categorical data and on independent t-test. For continuous data. P<0.05 was considered significant. The calculations were carried out using SPSS (Statistical Package for the Social Sciences)

Results

The study was conducted in a total of 75 diabetic patients who developed acute kidney injury. There were 47 males and 28 females. The aetiology and outcome of acute kidney injury in the above patients were found out. Blood urea, serum creatinine, serum electrolytes, fasting and post-prandial blood sugar, WBC count, platelet count and haemoglobin were included as the baseline parameters.

Table 1: Age distribution

Age Group	Number of patients (Percentage)
<50 years	15 (20%)
50-59	30 (40%)
60-69	21 (28%)
≥70	9 (12%)
Total	75 (100%)

Table 2: Distribution of mortality among male and female diabetic AKI patient

Gender	Mortality		P Value
	Yes	No	
Male	17 (34%)	58 (77%)	0.096
Female	3 (11%)	25 (89%)	

Table 3: Distribution of mortality with various infections in diabetic AKI patients

Infection	Mortality		P Value
	Yes	No	
No infection	2 (7%)	23 (93%)	0.096
UTI	5 (28%)	13 (71.42%)	
LRTI	0(0%)	7(100%)	
Sepsis	2 (33.33%)	5(66.66%)	
Leptospirosis	5 (83.33%)	1(5.71%)	
UTI & Sepsis	2 (100%)	0(0%)	

Table 4: distribution of mortality with aetiology in diabetic AKI patients

Aetiology	Mortality		P Value
	Yes	No	
Drugs	0(0%)	5 (100%)	**0.096**
CAD/LVD	0(0%)	4 (100%)	
Infection	5(22%)	18(78%)	
Volume depletion	0(0%)	8(100%)	
Urological obstruction	2 (13%)	11(87%)	
IRGN	0(0%)	3(100%)	
Drugs and infection	1(100%)	0(0%)	
Accl HTN & CAD/LVD	0(0%)	2(100%)	
CAD/LVD & volume depletion	0(0%)	2(100%)	
Infection & Urological obstruction	2(100%)	0(0%)	
Infection & IRGN	1(100%)	0(0%)	

Mortality in diabetic AKI patients was found to be increased when infections were associated with urological obstruction, drugs or IRGN.

Table 5: distribution of outcome of AKI in Type 2diabetes

S. No	Outcome	Number of patients	Percentage
1	Fully recovered	40	52.66
2	Partially recovered	10	13.33
3	Dialysis dependent	11	14
4	Mortality	15	10

52.66% had full recovery and 13.33% had partially recovered. Dialysis dependent found to be 20% and 14% was put on maintenance hemodialysis (Dialysis dependent).

Discussion

Infections were found to be the most common cause of AKI in the study. It accounted for 54 % of cases, among which UTI was found in more than half of the cases. In a prospective study by Khan and Ahmed, the most common focus of infection was found to be urinary tract (71.2%)[7].

Sepsis was found to be the most common cause for AKI in several studies. The lower proportion of sepsis in this study might be attributed to the fact, unlike the above studies, the majority of patients selected for were not critically ill patients from ICU, but from medicine and nephrology wards.[8].

Urinary tract obstruction was the second most common cause in this study that accounted for 23%. Vakrani et al found sepsis (52.9%) and

urinary tract obstruction (50%) as the leading causes for renal failure in diabetics. Jha et al., and Prakash et al., which evaluated AKI had shown that nephrotoxic drugs were the most common cause of AKI. The risk for mortality was found to be increased with increasing age, male sex, sepsis with UTI, BPH, increased mean blood urea and serum creatinine levels. Similar results were found in studies of Eswarappa et al[9].

Mortality was also found to be increased in patients with high mean FBS, PPBS, total WBC counts and serum potassium, and low serum sodium and platelet counts. The increase in awareness of these risk factors will help in the early identification of kidney injury that is critical for treatment or prevention of AKI[10].

Conclusion

Infection was the most common cause of AKI in Type 2diabetes patients in our study. Among drug induced renal failure patients, NSAIDS were noted to be most common cause. Age >60 and male gender were prevalent in the majority of AKI patients. About 52.66% of the total patients recovered to normal renal function, 13.3% recovered partially, with 14% of the total patients progressed for maintenance hemodialysis. Crude mortality rate among patients with AKI in the study group was 20%.

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