Early Acute Kidney Injury:
Examine the Prevalence, Risk Factors and Outcomes in Non-Surgical Patients

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ABSTRACT

Objective: To examine the prevalence of early acute kidney injury, risk factors and outcomes of life threatening disorder.

Study Design: Retrospective/Observational study.

Place and Duration of Study: This study was conducted at the Department of Nephrology, Shaikh Zayed Hospital Lahore from October 2018 to March 2019.

Materials and Methods: Total 200 patients of both genders with ages above 20 years were included. Patients demographic such as age, sex, residence were recorded after taking informed consent. Incidence of early acute kidney injury was examined during first 5 days of hospitalization. Acute kidney injury patients were screened according to Kidney Disease Improved Global Outcomes (KDIGO) guidelines. Risk factors associated to acute kidney injury were analyzed. Outcome in term of mortality was examined.

Results: There were 120 (60%) male patients and 80 (40%) were females with mean age 38.15±12.45 years. Forty (20%) patients were diagnosed to had acute kidney injury in which majority of patients 30 (75%) patients were male. Twelve (30%) patients had AKI stage I, 15 (37.5%) patients had stage II and 13 (32.5%) had AKI stage III. Pre-hospital nephrotoxic use, delay hospitalization, sepsis, age and low education were the associated risk factors of AKI (p=<0.05). Ten (5%) patients died in which 9 had AKI.

Conclusion: Prevalence of early acute kidney injury is high in hospitalized patients. Nephrotoxic use, sepsis, delay hospitalization and older age were the associated risk factors. Mortality rate is also high in patients with acute kidney injury.

Key Words: Acute Kidney Injury, Prevalence, Risk factors, Mortality

INTRODUCTION

Globally, acute kidney injury is considered one of the most common life threatening disorders with high morbidity, mortality.[1-3] Early and accurate diagnosis is very helpful measures to reduce the morbidity and mortality associated to acute kidney injury. Molecular markers of early kidney damage would be ideal[4], but unluckily these tools are not available for routine clinical use. In this scenario measurement of serum creatinine by Acute kidney injury network (AKIN) and KDIGO (Kidney disease improve global outcomes) are the essential tool for diagnosing acute kidney injury.[5,6]

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The incidence rate of acute kidney injury in hospitalized patients is 5-30% with high mortality and morbidity rate. It could be reduce if early diagnosis and risk factors associated to acute kidney injury were identified. It is very important to indentify the risk factors of AKI for better treatment and to decrease the mortality rate in hospitalized patients. Many of risk factors documented in development of acute kidney injury in hospitalized patients such as age, gender, comorbidities, pre-hospital nephrotoxic use, chronic kidney disease and sepsis, infections etc. If these risk factors are identified on early hospitalization than it could be very helpful to provide better treatment and to reduce the mortality and morbidity.[7,8] Many of previous studies reported these factors are directly associated in development of early acute kidney injury.[9,10]

MATERIALS AND METHODS

This retrospective/observational study was conducted at Department of Nephrology, Shaikh Zayed Hospital Lahore from 1st October 2018 to 31st March 2019. Total 200 patients of both genders with ages above 20 years were included. Patients demographic such as age, sex, residence, education were recorded after taking informed consent. Patients less than 20 years and those

with history of chronic kidney disease were excluded. At admission comorbidities such as diabetes mellitus, hypertension, infection, cardiovascular disease, chronic pulmonary disease and history of cirrhosis were examined. At enrollment prevalence of acute kidney injury were examined by serum creatinine according to the Acute Kidney Injury Network (AKIN) and Kidney Disease Improve Global Outcome (KDIGO) criteria. Patients were categorized in to stage I, II and III. Risk factors associated to acute kidney injury were analyzed. Outcomes such as mortality and need for hemodialysis was examined. All the data was analyzed by SPSS 20.0. Chi-square test was applied to examine the outcomes between acute kidney injury patients and non AKI patients. P-value <0.05 was considered as significant.

RESULTS

There were 120 (60%) male patients and 80 (40%) female patients with mean age was 38.15±12.45 years (Table 1). From all the patients, 40 (20%) patients found to have acute kidney injury while 160 (80%) with non-AKI (Table 2). In AKI patients, majority of patients were males 30 (75%) while 10 (25%) were females with mean age 52.36±10.75 years. 25 (62.5%) patients had rural residence while 15 (37.5%) patients had urban residence. Most of the patients 24 (60%) were illiterate. The median serum creatinine level was 0.09 mg/dl, The most common comorbidity in AKI patients was diabetes mellitus found in 16 (40%) patients followed by chronic liver disease 11 (27.5%) patients, cardiovascular disease found in 10 (25%) and hypertension in 8 (20%). Some of the patients had combine morbidities. 12 (30%) patients had KDIGO stage I, 15 (37.5%) patients had stage II and 13 (32.5%) had KDIGO stage III (Table 3).

Table No.1: Overall mean age and gender-wise distribution

Variable	No.	%
Mean age (years)	38.15+12.45	
Gender		
Male	120	60.0
Female	80	40.0

Table No.2: Prevalence of Acute kidney injury

Acute kidney injury	No.	%
Yes	40	20.0
No	160	80.0

The most common risk factor for acute kidney injury was age (p=0.001), pre-hospital nephrotoxic drugs use found in 20 (50%) with p=0.002, delay hospitalization 15 (37.5%) patients, sepsis in 12 (30%) and no education in 11 (27.5%) patients. Mostly patients had two or more risk factors associated to acute kidney injury (Table 4). Ten (5%) patients were died in which 9 were AKI patients and 1 patient was non-AKI (p=0.001). Four (2%) required hemodialysis all were

AKI, Need of ICU admission in 15 patients in which 12 were AKI (Table 5)

Table No.3: Characteristics of all the AKI patients (n=40)

Characteristics	No.	%
Mean Age (years)	52.36±10.75	
Gender		
Male	30	75.0
Female	10	25.0
Residence		
Rural	25	62.5
Urban	15	37.5
Education		
Literate	16	40.0
Illiterate	24	60.0
Comorbidities		
Diabetes	16	40.0
CLD	11	27.5
Cardiovascular disease	10	25.0
Hypertension	8	20.0
AKI Stages		
I	12	30.0
II	15	37.5
III	13	32.5

Table No.4: Associated risk factors

Risk factors	Non-AKI (n=160)	AKI (n=40)	P-value
Age	39.85±12.46	52.36±10.75	0.001
Pre-hospital nephrotoxic drugs use	35 (21.88)	20 (50)	0.001
Delay hospitalization	26 (16.25)	15 (37.5)	0.02
Sepsis	22 (13.75)	12 (30%)	0.01
No education	25 (15.63)	11 (27.5)	0.02

Table No.5: Outcomes among all the patients

Risk factors	Non-AKI (n=160)	AKI (n=40)	P-value
Died	1 (0.63)	9 (22.5)	0.001
ICU admission	3 (1.88)	12 (30%)	0.001
Required Hemodialysis	0 (0)	4 (10%)	<0.001

DISCUSSION

Globally, incidence of early acute kidney injury in hospitalized patients is quite high and ranges 5-30%.[11,12] Many of risk factors involved in development of acute kidney injury in which age, gender, socioeconomic status, education, diabetes mellitus, use of herbal medicine, chronic kidney disease stage 3,4, sepsis and delay hospitalization are the most frequent risk factors and documented in many of studies regarding acute kidney injury.[13,14] Present study was

conducted aimed to examine the incidence and risk factors of early acute kidney injury in hospitalized patients. In this regard 200 patients were met the inclusion criteria. In our study the incidence rate of acute kidney injury was 20%. A study conducted by Javier Enrique Cely et al[15] reported incidence of early acute kidney in hospitalized patients was 16% from 400 patients. Some other studies reported 5 to 7% incidence rate of early acute kidney injury in hospitalized patients.[16,17]

In present study majority of patients who developed early acute kidney injury were males 75% with mean age 52.36±10.75 years. There was significant difference regarding age between patients of AKI and non-AKI p=0.001. These results were similar to many other studies in which male patient population was high as compared to females and majority of patients were ages above 45 years.[18,19] In this study we found 25 (62.5%) patients had rural residence while 15 (37.5%) patients had urban residence. Most of the patients 24 (60%) were illiterate. The median serum creatinine level was 0.09 mg/dl, The most common comorbidity in AKI patients was diabetes mellitus found in 16 (40%) patients followed by chronic liver disease 11 (27.5) patients, cardiovascular disease found in 10 (25%) and hypertension in 8 (20%). Javier et al[15] reported history of diabetes mellitus and AHT were the most common comorbidities among AKI patients. Another study by Nie et al[20] regarding incidence of AKI among hospitalized patients reported hypertension, diabetes and cardiovascular disease were the most common comorbidities.

In our study the most important risk factor for acute kidney injury was age (p=0.001), patients with older age had a high risk of developing acute kidney injury among hospitalized patients. Pre-hospital nephrotoxic drugs use found in 20 (50%) with p=0.002, delay hospitalization 15 (37.5%) patients, sepsis in 12 (30%) and no education in 11 (27.5%) patients. Mostly patients had two or more risk factors associated to acute kidney injury. Many of studies demonstrated age, pre-hospital nephrotoxic use and sepsis were the most common risk factor of developing early acute kidney injury.[21,22] In this study 12 (30%) patients had KDIGO stage I, 15 (37.5%) patients had stage II and 13 (32.5%) had KDIGO stage III. These results vary in different studies. Some of studies reported mostly patients with KDIGO stage I and some studies reported most of patients were of stages II and III.[23,24] These results varies may be due to environmental change and due to the severe conditions of hospitalized patients.

In present study 10 (5%) patients were died in which 9 were AKI patients (p=0.001). 4 (2%) required hemodialysis all were AKI, Need of ICU admission in 15 patients in which 12 were AKI. These results showed similarity to some other studies in which mortality rate and need for ICU admission among AKI patients was high as compared to non-AKI hospitalized patients.[25,26]

CONCLUSION

Early acute kidney injury in hospitalized patients is the most common life threatening disorder with high rate of morbidity and mortality. We concluded that prevalence of early acute kidney injury is high in hospitalized patients. Nephrotoxic use, sepsis, delay hospitalization, older age and no education were the associated risk factors. Mortality rate is also high in patients with AKI. Severity of AKI is highly associated with high mortality rate.

Author's Contribution:

Concept & Design of Study:	Ali Saqlain Haider
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