

A PROSPECTIVE STUDY OF ACUTE KIDNEY INJURY IN YOUNG PATIENTS AT NEPHROLOGY DEPARTMENT IN OUR HOSPITALDr. Iqra Naeem¹, Dr. Muhammad Ovais Zafar², Dr. Khurram Irshad³ and Dr. Muhammad Irfan Jamil*⁴¹PMDC # B-90578-P, Nishtar Medical University Hospital, Multan.²PMDC # B-91916-P, Nishtar Medical University Hospital, Multan.³PMDC # B-91909-P, Nishtar Medical University Hospital, Multan.⁴Nishtar Medical University Hospital, Multan.***Corresponding Author: Dr. Muhammad Irfan Jamil**

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ABSTRACT

Background: The etiologies and clinical outcomes of acute kidney injury are variable throughout the world and has become important cause of morbidity and mortality in developing countries. Current study was planned to establish etiology, clinical profile and outcome of AKI among young patients in our hospital. **Methods:** It is a clinical, prospective observational study done in young patients aged 15 to 40 years, from July 2017- August 2018. 98 patients diagnosed clinically and according to RIFLE criteria were enrolled in the study and followed for 3 months to see outcome of disease. **Results:** Total 98 diagnosed patients were selected with age ranges from 15 to 40 years. Most of them were female 62/98 (63.2%). Clinical picture at the time of presentation was oliguria/anuria in 91%, hypertension in 40%, edema in 77.1%, nausea in 59.1%, anemia in 30.61%. Most common causes were obstetric (PPH/APH) in 30/98 (30.61%), sepsis in 13/98 (13.1%), obstructive urolithiasis in 16/98 (16.2%), paraphenylene diamine intake in 9/98 (9.1%), gastroenteritis in 8/98 (8%). Overall pre-renal causes were more frequent 56/98 (57.1%). In first encounter with our hospital most of the patients were in failure category according to RIFLE criteria 67/98 (68.3%). About 55/98 (56.12%) needed dialysis support. About 64.2% of the patient recovered. The mean duration of recovery was 16.4±26.7 days. Out of 98 patients, 18 developed CKD, 10 patients ended up as ESRD and mortality rate was 4/98 (4.09%). **Conclusion:** Leading causes according to our study were obstetrics, urolithiasis, and paraphenylene diamine. Patients with late presentation ended up with poor outcomes. A very handsome percentage of patients recovered in our study.

KEYWORDS: Acute kidney injury; young; etiology; outcome; RIFLE; Pakistan.**INTRODUCTION**

Acute kidney injury (AKI) is like a syndrome with variable severity and etiology represents rapid loss in renal function, resulting in failure to maintain fluid, electrolyte and acid-base balance. The term "AKI" enables the doctors to consider disease as a spectrum of injury.

The incidence of acute kidney injury has increase in the recent years, 60% of hospitalized patient develop acute kidney injury often as a part of multi-organ failure. Hence AKI has become contributor to morbidity and mortality. Patients who survive are often at risk of residual abnormalities like hypertension, proteinuria, and chronic kidney disease. Many studies done in the past regarding AKI, but this study was planned to determine etiology, clinical profile, short-term outcomes of acute kidney injury in young (15-40 years) patients in our hospital.

METHODOLOGY**Methods, Patient selection, Data collection**

It was a clinical, prospective, and observational study carried out at Nephrology and Medicine ward of Nishtar hospital Multan for period of 6 months (July 2017-August 2018).

Ethical clearance was obtained from institutional ethical review committee Nishtar medical university Multan. Valid written informed consent was taken from patients and legally acceptable relatives. All 98 patients with evidence of AKI according to RIFLE criteria were selected in the study. Patients with chronic renal failure, diabetes mellitus, and age below 15 years and above 40 years were excluded. Every patient received standard treatment according to their etiology, despite of their financial status. As hospital provides free of cost medical, surgical and dialysis facility. Comprehensive history, detailed physical examination and necessary investigation were done.

Statistical Analysis

Data obtained was tabulated and statistically analyzed using statistical package (SPSS) version 18.0. All values were presented as mean values \pm SD (standard deviation). Statistical significance was considered at p value <0.05 .

Risk	Increased serum creatinine 1.5 times or UO $<0.5\text{ml/kg/hr/6hrs.}$
Injury	Increased serum creatinine 2 times or UO $<0.5\text{ml/kg/hr/12hrs.}$
Failure	Increased serum creatinine 3 times or serum creatinine $\geq 4\text{mg/dl}$ or UO $<0.3\text{ml/kg/hr/24hrs.}$
loss	Loss of renal function persisting > 4 weeks.
ESDR	End stage renal disease requiring renal replacement therapy or maintenance dialysis for life survival.

UO= urine output, ESDR= end stage renal disease.

Etiologies of Acute Kidney Injury

It can be divided into three main categories:

1. Pre-renal, 2. Renal, 3. Post-renal.

Pre-Renal Causes

Throughout the world approximately 70% of the cases AKI attributed to Prerenal causes. Decreased renal perfusion associated with intravascular volume depletion e.g. from vomiting, diarrhea, blood loss or decrease arterial blood pressure e.g. sepsis results in reduce GFR. Marked decrease in renal perfusion makes autoregulatory mechanism useless and abrupt fall in GFR leads to AKI.

In this study the most common prerenal causes were: postpartum hemorrhage (PPH) and antepartum hemorrhage (APH) in 30/98 (30.1%), sepsis in 13/98 (13%), gastroenteritis in 8/98 (8.01%), and due to burn/trauma was 5/98 (5%). The maximum percentage of PPH/APH is because most of the patients are referred to our hospital from basic health unit and rural areas with already developed complications. There are many factors that contribute to such condition like, lack of awareness, antenatal care, facilities in rural areas and health professionals. Poor socioeconomic status, poor diet, lack of rest, stress and trauma further makes situation worse in our set up. The underlying mechanisms in PPH or APH that lead to acute kidney injury are hypervolemia (blood loss) and sepsis.

Renal Causes

Renal cause can be divided into tubular, interstitial, glomerular or vascular. Acute tubular necrosis is one of the most common cause that usually results from

Definition

AKI has defined on the basis of severity using RIFLE criteria (**R** for risk, **I** for injury, **F** for failure, **L** for loss of function, **E** for end stage renal disease).

prolonged hypotension (ischemia) or nephrotoxic agents e.g. parphenylene diamine (kala pathar) poisoning, hemolysis, myeloma, rhabdomyolysis, tumor lysis syndrome, drugs (aminoglycosides, cisplatin, amphotericin B) and radiographic contrast agents. In tubular injury patient gave history of medications (over-the-counter, herbal, hakim), trauma or radiological investigations. Glomerular injury usually post infectious includes HIV, hepatitis C or may be due to SLE, pulmonary renal syndromes. Patient came with complain of hematuria, cough, fatigue, weight loss. Interstitial nephritis mostly related to medication use.

In current study renal cause contribute to second most common cause leading to AKI in 21/98 (21.4%) cases. Nephrotoxic drugs in 6/98 (6%), contrast agents 3/98(3%), parphenylene diamine (kala pathar) poisoning in 9/98 (9.18%), malarial nephropathy 1/98 (1.02%), vasculitis 2/98 9(2%). Paraphenylene diamine (kala pathar) poisoning is very common in women these days because it is easily available and cheap. Severity and complication depends upon the amount taken, duration between intake and coming to hospital. Other complications like myocarditis, laryngeal edema and respiratory failure make outcome more worse.

Post-Renal Causes

Post-renal AKI in this age group usually develops from obstructive urolithiasis. Total 18 out of 98 diagnosed postrenal AKI, urolithiasis in 16/98 (16.3%), urethral stricture in 2/98 (2%). Male patients were more than female with 2:1. Early diagnosis and intervention can improve renal function.

Table 1: Etiology of Acute Kidney injury in 98 young patients.

Pre-renal	n	%of 98	Renal	n	%of 98	Post-renal	n	% of 98
Sepsis	13	13.1%	Nephrotoxic drugs	6	6.12%	Urolithiasis	16	16.3%
Gastroenteritis	8	8.16%	Contrast agents	3	3%	Urethral stricture	2	2%
PPH/APH	30	30.6%	Paraphenylene Diamine	9	9.1%			
Burn/trauma	5	5%	Malarial nephropathy	1	1%			
			Vasculitis	2	2%			
Total	56			21			18	

Sign and Symptoms	Observed in no. of patient	Percentage %
Oliguria/Anuria	90	91.8%
Edema	76	77.1%
Shortness of breath	46	46.9%
Nausea	58	59.1%
Vomiting	42	42.85%
Neurological symptoms	7	7.14%
Bleeding (platelet dysfunction)	2	2.04%
Hypertension	40	40.81%
Anemia	30	30.61%
Volume overload	20	20.40%

Clinical Features

Clinical feature varies with causes and severity of renal injury. In mild to moderate AKI, patients are usually asymptomatic. The main clinical features at the time of presentation were oliguria (urine output <400ml/24hours) or anuria (UO <100ml/24hours) in 90/98 (91.8%), edema in 76/98 (77%), shortness of breath in 46/98 (46.9%), nausea in 58/98 (59.1%), vomiting 42/98 (42.85%), neurological symptoms e.g. confusion, asterixis, uremic encephalopathy in 7/98

(7.14%), hypertension in 40/98 (40.81%), anemia in 30/98 (30.61%), volume overload 20/98(20.40%), bleeding due to platelet dysfunction in 2/98 (2%).

Severity of Acute Kidney Injury

According to RIFLE criteria 67/98 (68.3%) cases fell in **Failure**, 22/98 (22.4%) in **Injury**, 9/98 (9.1%) in **Risk** at the time of presentation with serum creatinine 8.6 ± 6.1 (S.D). About 55/98 (56.12%) case needed dialysis and 4/98 (4.08%) needed ventilator support.

Table 2: Severity and outcome according to RIFLE criteria among 98 patients.

	Recovered	CKD	ESRD	Death	Lost follow up
Risk (9)	9	---	---	---	---
Injury (22)	19	2	---	---	1
Failure(67)	35	16	10	4	2
Total (98)	63	18	10	4	3

Table 3: Outcomes according to etiologies among 98 patients.

	Recovered	CKD	ESRD	Death	Lost follow up
Sepsis (13)	8	2	2	1	---
Gastroenteritis(8)	7	---	---	---	---
Burn/trauma (5)	3	1	---	---	1
PPH/APH (30)	20	6	3	1	---
Nephrotoxic drugs(6)	4	2	---	---	---
Contrast agent (3)	2	---	---	---	1
PPD (9)	5	2	2	---	---
Malaria (1)	1	---	---	---	---
Urolithiasis (16)	9	4	2	---	1
Urethral stricture (2)	2	---	---	---	---
Vasculitis (2)	1	1	---	---	---
Unknown (3)	1	---	1	1	---

Short-Term Outcomes

About 63/98 (64.2%) of the patient recovered. The mean duration of recovery was 16.4 ± 26.7 days. Out of 98 patients, 18 developed CKD stage 2-4 (eGFR 90-15ml/min), and 10 patients ended up as ESRD. Out of 98 patients, 3 died and three lost to follow up. According to etiologies the outcomes are shown in the table 3.

department of our hospital. We conducted this study in young patients age ranges 15 to 40 years with mean age 24 ± 5.53 years. There were 36 males and 62 females. According to RIFLE criteria most of the patients fall in Failure category. We noted that the most common symptoms were Oliguria 91%, Edema 76%, and Nausea 58%.

DISCUSSION

This study provides information regarding etiology, short-term outcomes, severity of AKI according to RIFLE criteria about young patients in Nephrology

Etiology of AKI as reviewed in many medical literatures show wide range of variation among different age groups, developing and developed countries. In developed countries AKI is mostly hospital acquired. In this study most common etiology observed was

obstetrics e.g. PPH and APH in 30/98 (app. 30%), urolithiasis 16/98 (16.2%), sepsis 13%, paraphenylene diamine (kala pathar) 9%, gastroenteritis 8%. PPH and APH cases mostly referred from primary health center and rural areas when they develop complication and shock. Rural areas lack proper obstetrics, medical health professionals, transport mechanism and many other factors that contribute to poor outcomes. This comparable to a study done in china where gastroenteritis and urolithiasis is the most common cause of AKI. Obstructive urolithiasis was happened to be second most common cause in our study with in 16/98 (16.3%) patients. Some patient with urolithiasis was having family history of stone in urinary tract, some patients were not agree for any surgical intervention initially and developed CKD due to late intervention. Sepsis often requires multi-disciplinary approach and aggressive and ventilator support for better outcome. Unfortunately our hospital covers South Punjab of Pakistan and due to overburden of patients in our hospital multi-disciplinary approach sometimes not possible. In this study sepsis contribute to 13 out of 98 patients. Paraphenylene diamine (kala pathar) is another cause that leads to AKI along with several other complications e.g. myocarditis, laryngeal edema and respiratory failure. It is easily available cheap hair dye agent widely used by female for hair coloring, that's why some women took it for suicide purpose. Out of 98 patients with AKI 13 patients presented with Paraphenylene diamine (kala pathar) poisoning.

We documented significantly low mortality rate as compared to other studies done in different parts of Pakistan and world. This study has some limitations. Data in this study covers Medical and Nephrology ward of our hospital only. Study does not include cases from other departments like, General surgery, Oncology, Cardiology and Urology.

CONCLUSION

Leading cause according to this study were obstetric (PPH/APH), urolithiasis and paraphenylene diamine intake. Most of the patients reach tertiary care unit when they already have developed complications and lies in Failure category 67/98 (68.1%), despite of this many recovered. Degree of morbidity and mortality can be further reduced if awareness, education and basic health facilities are provided to rural areas. Further multicenter studies should be conducted to elaborate AKI in young patients. Risk factors should be minimized and preventive measures should be taken for better outcome.

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