

Causes of Acute Renal Failure in Nishtar Hospital Multan

1. Zahra Nazish 2. Faizan Mustafa 3. Muhammad Inayatullah

1. Asstt. Prof. of Medicine, 2. Medical Officer of Medicine, 3. Prof. of Medicine,
Nishtar Medical College and Hospital Multan

ABSTRACT

Objective: To identify the common causes of Acute Renal Failure (ARF) in Nishtar Hospital Multan

Study Design: Prospective observational study

Place and Duration of study: This study was conducted at Medical Wards, Nishtar Hospital Multan from September 2012 to March 2013.

Materials and Methods: One hundred and thirty six (136) patients presented with Acute Renal Failure to Nishtar Hospital of ages 15 and above.

Results: Fifty three patients (39%) were males and 83(61%) were females. Mean age of patients was 40.43 ± 18.56 years. Our study showed that common causes of ARF were diarrhea with or without vomiting (22%), septicemia (22%), obstetric causes like septic abortion and APH/PPH (19.11%), obstructive uropathy (11%), hair dye ingestion (9.6%), glomerulonephritis (7.35%), nephrotoxins (5.9%), hemolysis (4.4%) and cardiac failure (3.7%).

Conclusion: Diarrhea with/without vomiting, sepsis, post-partum and ante-partum hemorrhage, septic abortion, obstructive uropathy, hair dye, glomerulonephritis, nephrotoxic drugs, hemolysis and cardiac failure are the common causes of acute renal failure in our setup. ARF is associated with high morbidity and mortality. So all these causes should be managed aggressively to avoid this life threatening complication.

Key Words: Acute renal failure, causes, septicemia, diarrhea, APH/PPH, abortions, hair dye, obstructive uropathy, nephrotoxins

INTRODUCTION

Acute Renal Failure (ARF) is a common and life threatening condition. It has been estimated that it occurs in about 2-7% of all hospital admissions.^{1,2} Although there is no consensus clinical definition of ARF³, but according to RIFLE criteria (a mnemonic for three levels of severity-Risk, Injury and Failure-and two outcomes-Loss and End stage renal disease), it is abrupt deterioration in renal parenchymal function with serum creatinine of more than thrice normal (>3 mg/dl) and urine output less than 0.5ml/kg/hr for 24 hours.^{4,5} ARF is a clinical syndrome characterized by rapid decline in glomerular filtration rate (GFR), which leads to disturbance in fluid, electrolytes and acid-base homeostasis and retention of nitrogenous waste products.

Acute kidney injury (AKI) is recently suggested as the new nomenclature for ARF. The terminology of AKI was introduced to emphasize the importance of less severe impairment of kidney function which begins long before sufficient loss of renal excretory function and can be determined by blood, urine and tissue tests or imaging studies.^{6,7} Thus the term failure represents only a part of spectrum of damage to kidney.

ARF is a significant problem in hospitalized patients and is associated with high morbidity and mortality rates. Hospital and ICU mortality rates of patients with ARF are 25% to 80%.⁸

The etiology of ARF is often multi-factorial and can be classified into three groups; pre renal, renal and post renal.

Prerenal azotemia is characterized by a decrease in GFR due to a decrease in renal perfusion pressure without damage to the renal parenchyma. Causes of prerenal azotemia include: hypovolemia resulting from conditions such as hemorrhage, vomiting or diarrhea; impaired cardiac output resulting from heart failure with cardiogenic shock; decreased vascular resistance resulting from conditions such as sepsis or vasodilator medications.

The most common renal cause is acute tubular necrosis.⁹ It can be either ischemic or nephrotoxic. Prolonged or profound prerenal azotemia can result in ischemic damage to the kidney. Nephrotoxins which cause ATN can be exogenous or endogenous. Exogenous nephrotoxins include radio-contrast agents and certain antibiotics like aminoglycosides. Endogenous toxins include hemoglobin and myoglobin. Acute hemolysis causes release of hemoglobin from red blood cells and hemoglobinuria. Hemoglobin is nephrotoxic and leads to acute tubular necrosis. Transfusion reaction and black water fever in falciparum malaria are common examples.

In the past few years paraphenyline di-amine (hair dye) has emerged as an important cause of ARF in our population. Its ingestion is usually suicidal. It leads to rhabdomyolysis and release of myoglobin which causes myoglobinuria and acute tubular necrosis leading to ARF.¹⁰

Acute glomerulonephritis is another intrinsic cause of ARF but is relatively uncommon.

Post renal causes include obstructive uropathy which may be due to stones, strictures, benign prostatic hyperplasia or malignancy.

This study was aimed to identify the causes of acute renal failure in patients from Southern Punjab admitted in medical wards of Nishtar Hospital Multan. Identification of causes of ARF will enable health care service providers to prevent the number of episodes of this life threatening condition of ARF and reduce its mortality.

MATERIALS AND METHODS

Patients of acute renal failure of ages 15 years and above admitted in medical wards of Nishtar Hospital Multan from September 2012 to March 2013 were included in the study.

Patients who were already diagnosed cases of chronic renal failure, had small kidney size (< 9cm in length) or loss of corticomedullary differentiation on USG, serum creatinine < 3mg/dl or duration of symptoms > 3 months were excluded from the study.

Permission was taken from ethical committee of Nishtar Hospital Multan. Informed consent was taken from patients about their inclusion in this study. History regarding the biodata of the patients, causative factors, symptoms and duration of onset was taken. Clinical examination included vital signs, jugular venous pulse, basal crepitations and signs of dehydration. Venous blood samples for serum creatinine were sent to central lab Nishtar Hospital and USG abdomen was done by

radiology department of Nishtar Hospital. Information including all variables (age, gender, serum creatinine, cause of ARF) was noted on a proforma.

Mean $\pm$ SD was calculated for age of patient and serum creatinine. Frequencies and percentages were calculated for gender and cause.

RESULTS

One hundred and thirty six patients meeting the inclusion and exclusion criteria were studied. Of these, 53 (39%) were males and 83 (61%) were females. The age of patients ranged from 15 to 82 years with a mean age of 40.43 ± 18.56 . Serum creatinine level ranged from 3.1 to 18.4 mg/dl with a mean of 6.20 ± 3.01 mg/dl. In our study the most common causes of ARF were septicemia and diarrhea found in 30 (22%) patients. Other causes found were: obstructive uropathy in 15 (11%) cases, antepartum/postpartum hemorrhage (APH/PPH) in 14 (10.29%), hair dye ingestion in 13 (9.6%), septic abortions in 12 (8.8%), glomerulonephritis in 10 (7.35%), nephrotoxins in 8 (5.9%), hemolysis in 6 (4.4%) and cardiac failure in 5 (3.7%). Details of individual cause of ARF with age and sex distribution is as shown in table 1.

Nine patients (6.6%) had more than one of acute renal failure. Detail is shown in table 2.

If we exclude the patients with causes specific for females (APH/PPH, septic abortion and hair dye), then out of remaining 97 patients, 51 (52.6%) were males and 46 (47.4%) were females and mean age of patients was 46.56 ± 18.43 .

Table No.I: Age and sex distribution of individual causes of ARF

Cause	Total			Male			Female		
	No(%)	Mean Age(yrs)	Range (yrs)	No(%)	Mean Age(yrs)	Range (yrs)	No(%)	Mean Age(yrs)	Range (yrs)
Diarrhea $\pm$ vomiting	29(21.3)	50.03 ± 18.50	16-82	15(51.7)	55.2 ± 20.09	20-82	14(48.3)	44.5 ± 15.45	16-70
Sepsis	23(16.9)	44.26 ± 18.93	16-80	10 (43.5)	55.2 ± 17.34	27-80	13(56.5)	35.84 ± 15.96	16-74
Obstructive	13(9.6)	58 ± 16.22	18-79	9(69)	57.22 ± 16.70	18-74	4(31)	59.75 ± 17.42	45-79
Hair dye	13(9.6)	23.3 ± 5.98	15-38	2(15.4)	28.5 ± 13.43	19-38	11(84.6)	22.27 ± 4.29	15-27
APH/PPH	11(8.1)	26.18 ± 4.72	19-33	-	-	-	11(8.1)	26.18 ± 4.72	19-33
Septic Abortion	10(7.4)	26.1 ± 6.08	18-39	-	-	-	10(7.4)	26.1 ± 6.08	18-39
GN	9(6.6)	28.9 ± 8.97	17-45	7(77.8)	29 ± 10.16	17-45	2(22.2)	28.5 ± 4.94	25-32
Multiple causes	9(6.6)	35.88 ± 13.90	26-68	1(11.1)	-	68	8(88.9)	31.87 ± 7.43	26-49
Nephrotoxins	8(5.9)	47.1 ± 18.03	18-70	3(37.5)	45 ± 25.63	18-69	5(62.5)	48.4 ± 15.33	27-70
Hemolysis	6(4.4)	27.5 ± 6.31	21-38	4(66.7)	25.25 ± 4.71	21-32	2(33.3)	32 ± 8.48	26-38
Cardiac failure	5(3.7)	59.8 ± 10.89	41-68	2(40)	66.5 ± 2.12	65-68	3(60)	55.3 ± 12.66	41-65
Total	136(100)	40.4 ± 18.56	15-82	53(39)	48.79 ± 20.07	17-82	83(61)	35.08 ± 15.23	15-79

Table No.2: Multiple causes(n=9)

Common causes	No of patients
Septicemia	7
APH/PPH	3
Abortion	2
Obstruction	2
GN	1
Diarrhea	1
Combination	
Combination	No of patients
Septicemia + PPH	3
Septicemia + obstruction	2
Abortion + APH/PPH	2
Septicemia + diarrhea	1
Septicemia + GN	1

DISCUSSION

ARF is an abrupt deterioration in renal excretory function and typically diagnosed with accumulation of products of nitrogen metabolism such as urea and creatinine. It has many causes which may be pre renal, renal and post renal. Its etiology varies in various parts of the world. Common risk factors as observed in different studies include diarrhea, sepsis, obstructive uropathy, septic abortions, APH/PPH and glomerulonephritis. Various new causative agents like hair dye poisoning have been recognized. ARF is a serious condition with many life threatening complications. The pattern of ARF varies in different parts of the world according to environmental, geographic and socioeconomic conditions.¹¹

The purpose of our study was to determine frequency of different causes of ARF in the population of Southern Punjab admitted in Nishtar Hospital Multan.

Our study consisted of 136 patients out of which 39% were males and 61% were females. In another study conducted by Chijioke¹², 46.5% cases were males and 53.5% cases were females. Like our study ARF was more prevalent in females. But if we exclude the female specific causes (like abortions, APH/PPH and hair dye) in our study, then male to female ratio was almost equal (52.6% males and 47.4% females- ratio 1.1:1). Another study done by Kaballo¹³ showed that 64% of the cases were males and 36% were females. Here gender distribution was different from our study.

In our study, the patients with ARF were not significantly older as the mean age of our patients was 40.43 years. Excluding female specific causes with relatively younger ages, mean age increased to 46.56 years. Unlike our study age has been reported as a risk factor in a study by Pascual et al.¹⁴ However, El-Lozi et al¹⁵ could not demonstrate a relationship between patient's age and ARF.

The most common causes of ARF observed in our study were septicemia and diarrhea alone or with vomiting.

Septicemia alone was observed in 16.9% cases. It was also seen in combination with other pathologies in another 5.1% cases. Overall septicemia was seen in 22% cases. In a study carried out by Soliman¹⁶ in Egypt sepsis contributed to only 11.7% cases. While other studies conducted in third world countries like Nigeria by Chijioke¹² and in Peshawar by Khan et al¹⁷ showed that sepsis was the commonest factor contributing to 36% and 20% cases respectively. These results were similar to our study. The cause of septicemia in our set up is due to inadequate aseptic measures practiced during surgery and inadequate antibiotic therapies. Early identification of infection and its treatment with appropriate antibiotics can reduce the incidence of septicemia and ARF as its complication.

The other most common cause in our study was diarrhea with or without vomiting which was observed in 21.3% cases (22% overall). Diarrhea contributed to 14% and 22% cases in the studies by Khan et al¹⁷ and Chijioke¹² respectively. Soliman¹⁶ reported that it contributed to only 1.96 % cases. In developing countries poor personal hygiene, lack of sanitation and clean drinking water are responsible for high percentage of diarrhea. Inadequate medical facilities and rehydration leads to ARF in patients of diarrhea.

Obstructive uropathy was found in 11% cases in our study. Khan et al¹⁷, Soliman¹⁶ and Kaballo¹³ et al found it in 10, 9.8% and 9% cases respectively. These values are close to our study. On the other hand Chijioke¹⁴ found obstructive uropathy in only 5.8% cases.

The next cause found in our study was APH or PPH (10.29%). In the studies of Khan et al¹⁹ and Chijioke¹⁴ it was found in only 2% and 4.6% cases respectively. These results were different from our study. In our country lack of antenatal care, deliveries conducted by untrained dais and in adequate resuscitative measures are responsible for high percentage of APH or PPH causing ARF.

In our study hair dye poisoning constituted 9.6% cases. Kaballo¹³ found that it was responsible for 13.4% cases of ARF. Chrispal¹⁸ reported that 38.5% persons ingesting hair dye developed renal failure. It has emerged as a new risk factor of ARF in the past few years. Its use is mostly suicidal and most of the patients are females. Its easy availability is a major contributing factor to its increased use. Public awareness about toxicity of hair dye is an important measure for its prevention and its sale should be prohibited.

In our study abortions contributed to 8.8% cases of ARF. Khan et al¹⁷ observed that abortions caused 10% cases of ARF. Their observation was similar to our

study. While Chijioke¹² found that only 2.3% cases were due to abortions. Over all obstetrical causes (abortions + APH /PPH) were responsible for 19.11% cases of ARF in our study. In the study by Naqvi et al 18% cases were due to obstetrical causes.¹⁹ This high percentage of ARF due to obstetric causes is alarming and stresses the need of improvement in antenatal care in our country. Unnecessary induced abortions should be strongly discouraged.

Acute glomerulonephritis was responsible for 7.35% cases of ARF in our study while Chijioke¹² found glomerulonephritis in 9.3% case of ARF similar to our results. Soliman¹⁶ found that it caused 15.6% cases of ARF which was more frequent compared to our study. This lower percentage in our study could be due to lesser availability of diagnostic facilities like renal biopsy and actual frequency could be much higher.

In our study nephrotoxins caused 5.9% cases of ARF. In the study of Al-Homrany

7.3% cases were due to nephrotoxins.²⁰ In the study by Soliman¹⁶, nephrotoxins caused 15.6% cases of ARF which was much frequent than our study. Patients taking drugs which can cause nephrotoxicity need close monitoring of renal parameters.

Hemolysis was responsible for 4.4% cases of ARF in our study. While according to Chijioke and Khan et al, it caused 3.4 and 2% cases of ARF respectively^{12,17}. Another study conducted by Al-Rohani showed that hemolysis due to malaria was the commonest cause of ARF (27.9%).²¹ But in our study all cases were due to mismatched blood transfusions. This shows the need of extreme vigilance for proper grouping and cross matching before blood transfusions.

Cardiac failure with shock caused 3.7% cases of ARF in our study. In the study of Soliman¹⁶ it was the most common cause of ARF causing 19.6% cases. In the study of Khan et al only 2% cases were due to cardiogenic shock.¹⁹

CONCLUSION

Acute renal failure is a serious disorder with considerable morbidity and mortality. Our study suggested that septicemia, diarrhea, obstetric causes (APH/PPH, abortions), hair dye ingestion, obstructive uropathy, glomerulo nephritis nephrotoxins, hemolysis and cardiac failure are its common causes in our set up. Early detection and prompt treatment of all these causes can prevent this serious condition. This includes following strict aseptic measures during surgical procedures, early identification of infection and its treatment with appropriate antibiotics, improving hygiene to avoid diarrhea and early resuscitation in case of hypovolemia. Similarly, early diagnosis and treatment of obstetric complications causing APH/PPH and avoiding unnecessary induced abortions,

prohibition of sale of hair dye, monitoring renal parameters in patients taking drugs known to cause renal impairment, proper grouping and cross matching to avoid miss matched transfusion reactions, early recognition and treatment of intrinsic renal disorders like glomerulonephritis are other important measures to avoid this dreadful disease.

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Address for Corresponding Author:**Dr. Zahra Nazish**

Assistant Professor of Medicine
Nishtar Medical College and Hospital, Multan
Phone No: 03006331233
Email: zahranazish@gmail.com