SEVERE ACUTE KIDNEY INJURY IN ADULT NIGERIANS FROM UNIVERSITY OF ILORIN TEACHING HOSPITAL, ILORIN, KWARA STATE

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ABSTRACT

Background: Mortality rates in acute kidney injury (AKI) are still very high despite enormous research and technological advances in its management. It varies between 40-50% in hospitalized patients and 70-90% in cases admitted into intensive care units. Management of severe AKI is capital intensive and majority of Nigerians with the disease die prematurely because they can hardly afford cost of renal replacement therapy (RRT). Reasons for the persistent poor survival may vary from one region to another, even in the same environment.

Objective: To review clinical features and factors contributing to poor outcome of patients with AKI in Ilorin, Kwara State.

Subjects and Method: Retrospective appraisal of acute kidney injury at University of Ilorin Teaching Hospital, Ilorin, Nigeria (Jan. 1989- Dec. 2009.) All patients that met stage 3 RIFLE criteria for AKI and presented primarily or referred to our renal care centre were studied. RIFLE is the acronym for staging AKI which means Risk of renal dysfunction, Injury to the kidneys, Failure of renal function persisting for 24hours, Loss of renal function persisting for more than 1 month and End stage kidney disease (loss of function for more than 3 months). A total of 113(52males and 61 females) out of 1,275 renal patients that had AKI (8.86%) were reviewed.

Results: Unusual weakness, oliguria, altered sensorium, vomiting and hiccups were major presenting features. About 80.5% of the patients were less than 40 years of age with male and female mean ages of 27.29 + 7.77 and 29.15+ 6.98 years respectively. The aetiological factors were septicaemia, severe gastroenteritis, acute glomerulonephritis, drug induced, ante/post partum haemorrhage and obstructive uropathy. Overall mortality rate was 47.6%. Sixty three patients were managed conservatively with 62% mortality while 33 and 9 patients had haemodialysis and peritoneal dialysis with mortality rates of 15% and 67% respectively.

Conclusion. Aetiological factors were largely preventable and treatable conditions. The main contributory factors to high mortality rate were ignorance, late presentation, delayed intervention therapy, bleeding diathesis, severe infections, financial constraints and high cost of dialysis. Haemodialysis appear to be a better modality of treatment than peritoneal dialysis for severe AKI in our environment.

INTRODUCTION

Acute kidney injury (AKI) is rapid deterioration in renal function resulting in accumulation of metabolic waste, sufficient to cause uraemia, following variety of insults to previously normal kidneys. [1,2] Accurate determination of AKI incidence is difficult due to varying definitions of the disease.[1] It is responsible for about 5-8% of medical admissions and accounts for 25-30% of patients admitted into critical care units (CCU), 90% of which have multiple organ failure (MOF).[3] It is a common cause of morbidity and mortality worldwide[3-6].

Mortality rates in AKI are still very high despite enormous research on the pathophysiology and technological advances in its management[7.] It varies between 40-50% in hospitalized patients and 70-90% in cases admitted into intensive care units.[2,6,7,8] Reasons for the persistently poor survival include inadequate dialysis prescription, inability of dialysis to replace endocrine, cytokine, metabolic and immunological functions of the kidneys. Delay in initiating dialysis is a contributory factor as some studies have suggested that early initiation improves outcome[8,9]. Unlike in developed world where AKI can be reasonably differentiated from chronic renal failure (CRF) using elevated levels of parathyroid hormones[10], carbamylated haemoglobin[11,12], creatol[13] and cystatin C[14], facilities for such biochemical indices are lacking in developing countries, including Nigeria[10-14]. The renal ultrasonic parameters of poor corticomedullary differentiation (CMD) and shrunken kidneys which are often used in differentiating between AKI and CRF are not discriminatory enough as loss of CMD can be a feature of acute kidney infection and normal or increased kidney size may be seen in end stage kidney disease (ESKD) depending on the etiology. It is therefore difficult to distinguish between reversible acute-on-chronic renal failure and AKI as both conditions largely present with oliguria [6,15]. In Nigeria, very little information exists regarding presenting features of severe AKI and factors influencing outcome of the disease [6,15,16.]

Management of severe AKI is capital intensive and majority of Nigerians with the disease die

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Keywords: Acute kidney injury, Adult Nigerians, Clinical features, Outcome.

prematurely because they can hardly afford cost of renal replacement therapy (RRT), despite availability of such facilities. There is no RRT subsidy in Nigeria and our current National Health Insurance Scheme (NHIS) is blank on RRT. The purpose of this study is to review etiology, clinical features and factors contributing to poor outcome of these patients in Ilorin, Nigeria

SUBJECTS AND METHODS

It was a 21year (Jan.1989- Dec.2009) retrospective appraisal of causes, clinical features and factors influencing outcome of AKI. All patients that met stage 3 RIFLE criteria for AKI[17] and presented primarily or referred to our renal care centre were studied. RIFLE criteria as proposed by Acute Dialysis Quality Initiative (ADQI) are an acronym that divides AKI into 5 stages as follows:

Stage 1-Risk: Serum creatinine increased 1.5 times or urine production of <0.5ml/kg for 6 hours
Stage 2-Injury: Doubling of creatinine or urine production <0.5ml/kg for 12 hours
Stage 3-Failure: Tripling of creatinine or absolute serum creatinine >355µmol/l or urine output < 0.3ml/kg for 24 hours
Stage 4-Loss: Persistent AKI or complete loss of kidney function for more than 1 month
Stage 5-End-Stage renal Disease: Complete loss of kidney function for more than 3 months

The inclusion criteria comprised majority of the following features: Short duration of illness in days and weeks, unusual weakness, vomiting, diarrhea, anorexia, malaise, hiccups, altered sensorium, body swelling, pruritus, polyuria, loin pains, urine output below 0.3ml/Kg /24hours and blood biochemistry that showed tripling of creatinine in 24 hours from recorded initial value or absolute creatinine levels greater than 355mmol/L and more than 75% reduction in estimated glomerular filtration rate (GFR) using standardized modification of diet in renal disease (MDRD) study equation[18]. Excluded from the study were patients with previous history of renal disease, more than three months duration of illness, ultrasonographic evidence of shrunken kidneys and those who had suggestive clinical features but could not be investigated due to poor finances.

Majority of the aetiological factors were obtained from clinical features. All patients with suspected infections had blood, urine and stool cultures with complete blood count which showed leucocytosis and toxic granulations of neutrophils but no growth in cultured body fluids. The diagnosis of acute glomerulonephritis was made in the presence of facial/ankle oedema, macroscopic haematuria, hypertension and mild proteinuria. Treatment modality was informed by severity of azotaemia, presence of complications like haemodynamic instability, uraemic bleeding and acute abdominal conditions as well as financial constraints. Patients that benefitted from conservative measures were placed on daily 0.4-0.6gram/kg body weight of protein, high carbohydrate diet providing 2500-3500 calories daily and fluid intake restricted to 1-1.5 litres per day plus measured losses in the preceding 24hours, control of blood pressure with anti-hypertensive drugs and correction of anaemia with drugs and/or blood transfusion . Haemodialysis was instituted in patients who had severe ureamic symptoms like persistent vomiting and hiccups, profound muscle weakness, ureamic bleeding and features of encephalopathy and could afford the procedure. Majority had 4 hourly 2 to 3 sessions of haemodialysis using Fresenius or Gambro machines while some benefited from 2 to 4 hourly cycle of two litres intermittent peritoneal fluid exchanges before they got clinically well. Cardiovascular instability, hypercatabolic state and co-morbid conditions were the main determinants for preference of either haemodialysis or peritoneal dialysis in these patients. The survivors were followed up after discharge in the nephrology clinic till they achieved normal renal function based on clinical and laboratory parameters. Data was analyzed using SPSS version 16.

RESULTS

A total of 113(52males and 61 females) out of 1,275 renal patients that had AKI (8.86%) were reviewed. The age range was between 13-69 years with a mean of 28.29 $\pm$ 5.19

Fig 1: Aetiological Factors in Acute Renal Failure

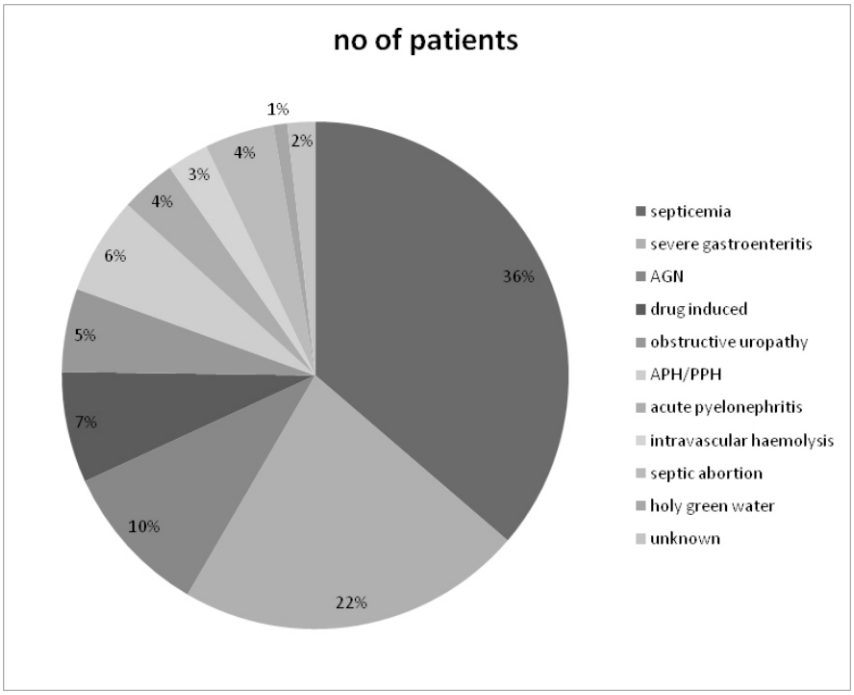


Fig 2: Clinical Features of Acute renal Failure

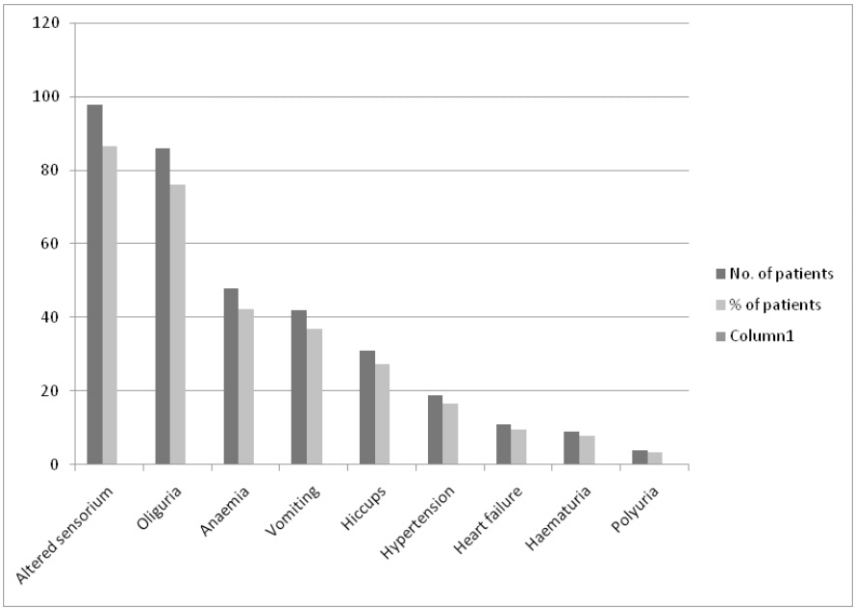
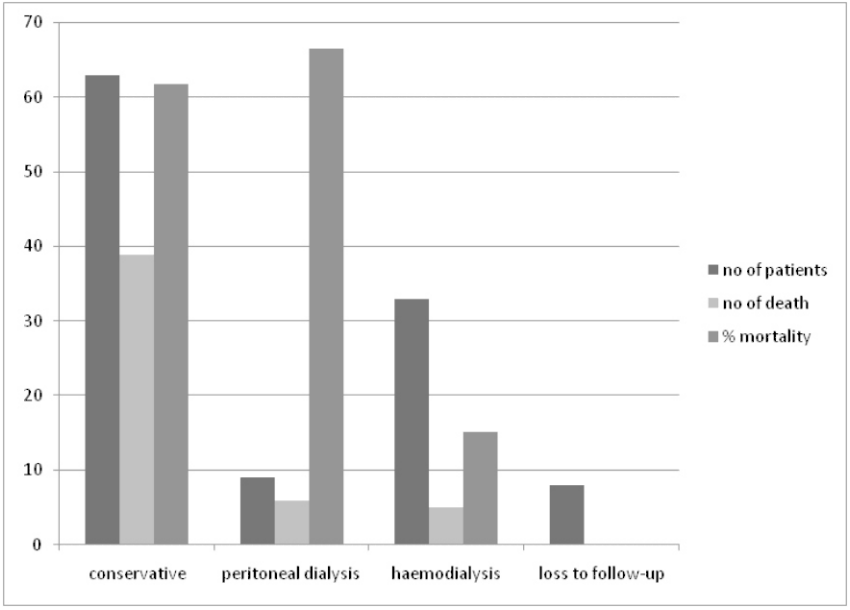


Fig 3: Treatment Modalities and Outcome



years. About 80.5% of the patients were less than 40 years of age with male to female ratio of 1:1.2 and mean ages of 27.29 ± 7.77 and 29.15± 6.98 years respectively. Eight six (76.1%) patients were oliguric at presentation. Unusual weakness, altered sensorium, vomiting and hiccups were seen in 92%, 86.7%, 37.1% and 27.4% respectively (Fig 1). Severe anaemia that necessitated blood transfusion was present in 48 cases (42.4%).

The main aetiological factors (Fig 2) were septicaemia (36.2%), severe gastroenteritis (22.1%), AGN (9.7%), drug induced (mainly due to NSAID-Ibuprofen, 'Alabukun' phensic, aspirin, piroxicam) and co-administration of herbal remedies plus insertion of herbal vaginal pessary (7%) and ante/post partum haemorrhage (6.1%). Obstructive uropathy(benign prostate hypertrophy, urethral stricture and pelvic tumours), septic abortion, acute pyelonephritis, intravascular haemolysis and intake of holy green water constituted 5.3%, 4.4%, 3.5%, 2.6% and 0.8% respectively while 1.7% were unclassified due to insufficient information from the case files.

The overall mortality rate was 47.6%. Sixty three patients were managed conservatively with 62% mortality while 33 and 9 patients had haemodialysis and peritoneal dialysis with mortality rates of 15% and 67% respectively (Fig 3). The poor prognostic factors identified were severe infections, late presentation, delayed intervention therapy and underlying/concurrent medical illness. Major factors that influenced mode of therapy were severity of AKI, cardiovascular instability, co-morbid condition and financial constraints.

DISCUSSION

Prevalence of AKI in Nigeria is largely unknown. Available hospital data shows that it probably accounts for 10% of patients seen in renal units and over 40% of patients admitted into intensive care units. It accounts for about 8.6% of all renal patients in our centre. The main clinical features from this study were profound muscle weakness, altered sensorium and oliguria. This was because of late presentation as more than 80% of them came when they needed dialysis. The finding of oliguria in 76% of our cases is in accord with other studies that noted reduction in urine output as the most characteristic symptom of AKI[2,3,15,16]. There is no evidence that conversion of oliguric to non-oliguric phase with use of diuretics actually improve outcome in these patients. Generally, a period of about two weeks is required before sufficient renal function returns and polyuric phase is crucial as poor management may result in further injury to the kidneys[8,9].

Majority of our patients presented in a setting of septicaemic illness in which the primary focus could not be identified from clinical features, chest X-ray and sonographic studies. Attempt at bacteriological proof of infection was difficult as culture of body fluids were negative for organisms. The contributory factors were abuse of antibiotics which includes penicillin, cephalosporin,

quinolone and macrolide bought from drug stores without prescriptions prior to presentation, inability to carry out investigations because of financial constraints, scarcity of proper laboratory support, concealment of information and poor recall of sequence of events. Febrile illness was a prominent feature in many of the patients with severe gastroenteritis, acute glomerulonephritis and obstructive uropathy. It may be alluring to conclude that most of these patients with febrile illness had typhoid as there are reports in literature strongly associating typhoid fever with acute kidney injury[19,20].

Earlier studies have lamented on the difficulty in obtaining bacteriological proof and wide spread abuse of Widal agglutination test in the diagnosis of typhoid fever[6,21]. We observed that none of the deceased patients in whom the cause of AKI could not be found had post-mortem examination. The contributory factors include emotional response to grief, unwillingness to accept autopsy, intense desire to bury deceased relations intact, cultural reasons, religious belief in life after death and poor information/communication skill to relatives of the deceased. These concerns may explain the low post-mortem rate in our hospitals[6].

The use of unprescribed drugs and herbal remedies were aetiologically responsible for AKI in 7% of our cases. This figure is similar to 8.8% and 8% reported by Ojogwu[22] and Bamigboye et al[16] in Benin and Lagos respectively. Our findings on drug related AKI contrast with 23% and 11% observed in the studies of Adelekun et al[23] and Otieno et al[24] at Ile-Ife and Nairobi respectively.

A high overall mortality of 48% in this review is similar to those reported by various authors[5,6,22,25]. The main contributory factors to high death rate were late presentation, delayed intervention therapy, ureamic bleeding, severe systemic infections and underlying/co-morbid conditions. Septiceamic illness and bleeding diathesis were prominent features in most of the fatal cases. An important observation among severe AKI patients was that those that benefited from haemodialysis did better than those on peritoneal dialysis. This was not surprising as they were haemodynamically stable while presenting in high catabolic state that needed high clearance technique from haemodialysis. The contributory factors to comparatively higher mortality among those on peritoneal dialysis were uncontrollable high catabolic state and haemodynamic instability at presentation as there was no case complicated by peritoneal infection. It was difficult to comment on the outcome of those managed conservatively as majority of them were moderately uraemic at presentation. However, we observed that majority in this category, terminally had severe azotaemia and overwhelming sepsis despite the institution of potent and safe antibiotics. This raises concern that it may be difficult to control infections in a setting of severe uraemia or that uncontrollable infection actually worsened azotaemia in these patients. Haemodialysis appear to be the preferred mode of therapy for case of severe AKI as it was associated with better outcome.

The limitations of this study include the retrospective nature which suffer from possibility of poor records and missing clinical notes, poor state of these patients at presentation, scarce laboratory facilities and financial constraints as contributory factors to inadequate evaluation. An interesting but disappointing finding was that majority of the causative factors in this study are preventable, yet AKI resulted in high mortality. This underscores the need to pursue preventive aspects of renal diseases rather than costly treatment modalities for severe AKI which majority of our patients can hardly afford.

In Conclusion, the clinical features and factors influencing outcome of AKI at University of Ilorin Teaching Hospital, Ilorin, Nigeria has been analyzed. There is serious concern about the etiological factors, which are largely preventable and treatable conditions. A high number of these patients were under 40 years of age and majority presented in a setting of septicemic illness. The main contributory factors to high mortality rate were ignorance, late presentation, delayed intervention therapy, bleeding diathesis, severe infections, financial constraints and high cost of dialysis. Haemodialysis appears to be the preferred modality of treatment for severe AKI as it was associated with better outcome. This review calls for detailed prospective nationwide collaboration study of AKI in Nigerian adults in order to formulate practicable preventive and management strategies.

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