Original Article

Evaluation of Tropical Acute Kidney Injury and Its Early and Late Outcome in Atertiary Care Hospital in Eastern India

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ABSTRACT

Background : Acute kidney injury (AKI) in tropical and subtropical countries differ from their temperate counterparts in their modes of origin and clinical presentation. The aetiology of tropical AKI is varied and the volume of literature on this issue is meagre in eastern part of India .The current study explored the prevalence of different causes of tropical AKI, along with its early and late outcomes among patients admitted to a tertiary care hospital in Kolkata of Eastern India.

Methods : This is an observational study with prospective nature, conducted in the inpatient wards of a tertiary care teaching hospital in Kolkata at the eastern part of India for a duration of one and half year from February 2020 to July 2021. A sample of 50adult population, aged between 18-90 years comprising both male and female presenting with acute kidney injury undergone the current study.

Results : The mean age of the patients was 30.86 (with standard deviation+/- 6.56) years, most were men, hailing from rural areas. Majority developed AKI following an infection, commonly Malaria and Scrub typhus. Of the non-infectious causes snake bite envenomation was important. Oliguria were the most important complications and 32% patients required haemodialysis. The mean duration of hospital stay was 15.18 (SD +/- 6.64)days. Among the study population8% died when undergoing inpatient treatment in hospital.

Conclusion: Tropical AKI in eastern region of India was mostly caused by infections of which Malaria and Scrub Typhus are common followed by snakebite envenomation among rural young men. The disease is associated with a long hospital stay but relatively less mortality.

Key Words: *Acute Kidney Injury, Aetiology, Tropical disease, Clinical Outcome*

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INTRODUCTION:

India is the most populous and a fast developing country of the world and has both tropical and subtropical climate due to its varying geography . Due to varied climatic condition along with existent global warming it experiences propagation of infections with high burden of infection like Malaria, Dengue, Scrub Typhus etc. as well as natural calamities like snake bite. The young working people of low socioeconomic strata belonging to the rural areas are often the victims of the situation. These people often move to higher Centre far away from their home where upgraded infrastructure is available. The sociopolitical and economic heterogenicity combined with transport delay often put a strong influence on the health care delivery issues as well as disease behavior and clinical outcome, often culminating in fatal complication with immediate or late sequelae .These people often incompletely treated or untreated , ultimately present with Acute Kidney Injury (AKI) in a tertiary care institution .These patient population comprises a relatively younger age group compared to western countries where older people with multiple comorbidities developed AKI in hospital settings after acute illness or surgery or following a diagnostic intervention.

This work is an endeavor to explore the prevalence of tropical AKI of different etiology and its immediate clinical outcome in tertiary care hospital in eastern India as well as to study of its late sequelae. The Volume of Study on this issue is meagre in literature till now, specially in eastern part of India prompting us to conduct a study of this kind .

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Materials and Methods:
Study Design – The study is an institution based observational study with a prospective design.
Study setting and population - This study was conducted in the indoor wards in the department of medicine and Nephrology at Nil Ratan Sircar Medical college , Kolkata , India on a sample population of fifty patients for the duration of one& half year spanning from February, 2020 to July ,2021 .

The sample was made by simple random selection. Patients belonging to eighteen years or above who developed AKI due to tropical causes were included in the study. Those with acute on chronic kidney disease, preexisting renal disease , AKI due to obstetric complication , pediatric patients with AKI, poisoning , sepsis as well as the patients who refused to give consent were excluded from the study . Data was collected in predesigned proforma after informed consent were taken from patients or from their guardians after detailed explanation of the study in their own language along with prior approval from institutional Ethics Committee .We elicited the Clinical history of febrile illness, chill and rigor , any scar mark related to tick bite, icteric illness, fever, hemorrhages, Rash , history of snake bite, decreased urine output , altered sensorium, past history or treatment .The information as to the sanitation status inside house or locality as well as socioeconomic status was also taken into account . All relevant routine examination including CBC , serum sodium, potassium, urea, creatinine, LFT , blood sugar , ESR ,CRP , routine and microscopic examination of urine, 24 hour urinary protein estimation , radiological examination like USG , CT scan was undertaken .AKI was defined by RIFLE / KDIGO criteria. In order to confirm the aetiology of AKI the following investigation undertaken including Malaria Rapid Diagnostic Test, Malaria Parasite slide test , dengue NS 1 antigen, Dengue IgM & IgG, FDP , D- Dimer , serum Fibrinogen ,Blood culture and stool culture . The patients was followed up during the period of hospital stay as well as upto six months after discharge from hospital. CKD was defined by creatine clearance < 60 ml/min for > 3 months. Ethical approval received from Institutional Ethics Committee of NRS Medical College, Kolkata vide Memo no NMC/710 dated 10.02.2020. The data was analyzed with SPSS 21 software . A P Value of <0.05 with 95% Confidence Interval was considered statistically significant.

Results:
The results was analyzed and described in three relevant are as related to Background characteristics like age, sex and etiology of AKI along with early and late outcome of the disease .

Out of the population of 50 patients majority ie , 25 (50%) patients belong to 18-29 years, ,19(38%) patients to 30-39 years and 6 (12%) patient to 40-49 years with the mean age of the study population was 31 years (SD +/- 6.56) . As per gender distribution 32 (64%) were male vs 18 (36%) were female. The etiological break up in our study is given below along with duration of hospital stay and data related to dialysis frequency .

Table 1 :Chart showing survival outcome, duration of hospital stay and dialysis frequency of study subjects (n= 50)

Variables	Survival Outcome		Chi Squire value, df(degree of freedom) , P Value
	Survived	Expired	
Cause of AKI			
Dengue	5	1	
Leptospirosis	6	-	
Mixed Malaria	2	-	
Plasmodium falciparum	4	-	5.842, 7, 0.558
Plasmodium vivax	8	-	
Snake bite	6	2	
Scrub Typhus	11	1	
Typhoid	4	-	
Duration of hospital stay			
< 7 -	1	3	
8-14	30	1	26.661, 2, <0.001
>15	15	-	
Number of Dialysis during hospital stay			
None	34	-	
2-3	5	3	13.202, 3 ,0.004
4-5	5	1	
6-8	2	-	

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Table 2 : Distribution of study subjects according to progression to CKD as late clinical outcome (n=46)

Progression to CKD	Frequency	Percentage
No	43	93.5
Yes	3	6.5
Total	46	100

CKD is defined as Creatinine clearance < 60 ml/ min for > 3 months .

Table 3 : : Distribution of study subjects according to eGFR value (ml/min/1.73m^2) at follow up visit (n=46)

e GFR (ml/min/ 1.73 m^2)		P value
Mean	Standard deviation	
82.15	10.86	
85.89	14.16	< 0.001
93.86	15.85	
101.45	19.95	
104.09	21.23	

Table 4 : Values of eGFR (ml/min/1.73 m^2) , serum creatinine and urinary protein at follow up visits among the surviving patients (n=46)

Follow up visit (weeks)	eGFR (ml/min/1.73m^2)	
	Mean	Standard deviation
12	54.33	2.49
24	48	4.08
	Serum creatinine	
	Mean	Standard Deviation
12	1.53	0.09
24	1.7	0.08
	Urinary Protein	
	Mean	Standard Deviation
12	71.6	2.35
24	146.7	44.96

DISCUSSION:

Our study shows that Tropical acute kidney Injury occurred due to direct invasion of the kidney by pathogen of varied tropical etiology .

The current study conducted on fifty patients with AKI due to tropical pathogen .Most of the study population were male (64 %) belonging to age group of 18-29 years . The mean age was 30.86 years. Acute kidney Injury were mostly caused by scrub Typhus (24%) followed by vivax and falciparum malaria comprising 16% each . Other causes were snake bite, Dengue and typhoid infection. This finding corroborates with one group of Authors (Basu G et al 2011), whereas Leptospirosis were commonest cause of AKI in another study by(Jayalal Jayapalan Nair et al, 2016) . Early outcomes are measured by the parametersof duration of hospital stay , number of dialysis received and the number of patients died in hospital .Most of the patients(62%) stayed in hospital for 8 -14 days ,with a mean duration of 15.5 days . Almost 32% patients were treated with hemodialysis, others conservatively. Amongst these four patients constituting 8%of patient population died in hospital .It has been shown that the proportion of death was more among the older patient population compared to the younger ones which is statistically significant (p value= 0.023) As regards to the delayed consequences 6.5% patients advanced to chronic CKD . One out of six Leptospirosis cases (16.7%) progressed to CKD .Mean eGFR improved uniformly during the follow up period of 24 weeks in most patients which was statistically significant (P Value < 0.001) .Among the surviving 46 people three patients (6.5%) developed CKD.

This study has shown that the etiology of AKI was not associated with any specific final disease outcome measure . The patients with shortest hospital stay in this study were due to death, which was statistically significant (P value < 0.001) .The survivors attended dialysis session more (Table- 1) .

CONCLUSION:

Mosquito borne diseases like Malaria and Dengue, snake bite, zoonosis like Leptospirosis forming the bulk of tropical AKI .The disease leads to long hospital stay but little mortalityand a small proportion of these cases may progresses to chronic kidney disease as long term sequalae.

Authors Recommendation:

Tropical acute Kidney injury has long hospital stay and relatively less mortality if patients are managed timely and judiciously. It can be preventable by greater awareness, anti mosquito measures at administrative and individual level,

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improvement of basic health needs such as maintaining proper sanitation and improvement of environmental condition to farm workers.

Limitation of study :

Our patient comprised only convenient patient population attending in a tertiary care hospitalin eastern India, so the actual figure of overall magnitude and assessment of the problem is inappropriate to apply on the whole population .

Abbreviations :

AKI- Acute Kidney Injury ,CBC- Complete Blood Count , CT -Computerized Tomography, CRP- C Reactive Protein, CKD – Chronic Kidney Disease, df- Degree of freedom , D- Dimer , ESR- Erythrocyte Sedimentation Test , eGFR- estimated Glomerular Filtration Rate , FDP- Fibrin Degradation Product , KDIGO- Kidney Disease Improving Global Outcomes , LFT- Liver Function Test, MP- Malaria Parasite, NS1 Antigen- Non-structural protein antigen, NMC-National Medical Commission(India), NRS Medical College- Nil Ratan Sircar Medical college , P-Value – Probability Value, RIFLE- Risk ,Injury, Failure ,Loss of Kidney Function, and End -stage Kidney disease , SD- Standard deviation, SPSS 21 software- Statistical Package for Social Sciences 21 software ,USG- Ultrasonography

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