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Acute Kidney Injury in Tropical Acute Febrile Illness of Malwa Region

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Abstract: Tropical Acute Febrile Illness (TAFI) is defined as all acute febrile syndromes with oral temperature over 37.5oc within the last 24 hours and less than two weeks, in tropical and sub-tropical developing countries with nonspecific symptoms and signs. Addressing the unique circumstances and needs of developing countries, especially in the detection of AKI in its early and potentially reversible stages to prevent its progression to kidney failure requiring dialysis, is of paramount importance. This study is conducted with the objectives to highlight the occurrence of acute kidney injury by the RIFLE criteria as well as their association with requirement for RRT and in-hospital mortality in patients with established diagnosis of tropical acute febrile illness, common being malaria, salmonellosis, dengue and leptospirosis scrub typhus in central India. RRT requirement was 0(0%) among (12) total cases of vivax malaria and 0(0%) amongs (4) total AKI in vivax malaria. RRT requirement was 0(0%) among (12) total cases of leptospirosis and 0(0%) amongst (5) total AKI in leptospirosis. RRT requirement was 4(10.81%) among (37) total cases of dengue and 4 (40%) amongst (10) total AKI in dengue.In present study most common TAFI was malarial fever 44 (31.43%), followed by dengue fever 37 (26.43%), enteric fever 31 (22.14%), scrub typhus 16 (11.43%), leptospirosis 12 (8.57%). In malarial fever plasmodium falciparum (23) contributes to maximum number of cases followed by vivax malaria (12) and mixed malaria (9). In this study out of total (39) AKI patients, 25.64%(10) AKI caused by falciparum malaria, another 25.64%(10) AKI by dengue fever, 12.82%(5) AKI by leptospirosis, vivax and scrub typhus each contribute to 10.26%(4) of AKI, mixed malaria and enteric fever each contributes to 7.69%(3) of AKI. Hence maximum burden of AKI was due to falciparum malaria and dengue fever.

Keywords: Complete blood count, Peripheral smear for malarial parasite, Blood urea, Serum creatinine, eGFR (estimated Glomerular filtration rate) Serum sodium, Serum potassium, Total bilirubin ,SGOT, SGPT, INR, ABG (whenever necessary), Urine output, Malarial antigen (falciparum and vivax), Leptospira IgM antibody, Dengue serology, Scrub typhus IgM antibody, Enteric fever TO/TH antibody titre, Ultrasound,abdomen, Chest x-ray.

INTRODUCTION

Tropical Acute Febrile Illness (TAFI) is defined as all acute febrile syndromes with oral temperature over 37.5oc within the last 24 hours and less than two weeks, in tropical and sub-tropical developing countries with nonspecific symptoms and signs. Nonspecific symptoms include all the symptoms that will not help us to localize to a particular system and are the usual complaints of a person with acute febrile illness like fever, generalized body pain, loose stools, vomiting, swelling of legs, generalized swelling of the body, decreased urine output, breathlessness, cough, chest pain, altered sensorium, headache and nonspecific signs include all the signs that will not help us to localize to a particular system like fever, tachycardia, myalgia, conjunctival congestion, rashes, joint pains and others[1]. TAFI with Acute Kidney Injury (AKI) was a major cause of mortality [2]. The tropics have unique health care problems that have not been of much concern to rest of the world until recently. Increasing travel and immigration have made neglected tropical diseases relevant for almost all regions in the world. The burden of AKI may be most significant in developing countries 3 with limited resources for the care of these patients once the disease progresses to kidney failure necessitating RRT. Addressing the unique circumstances and needs of developing countries, especially in the detection of AKI in its early and potentially reversible stages to prevent its progression to kidney failure requiring dialysis, is of paramount importance. This study is conducted with the objectives to highlight the occurrence of acute

kidney injury by the RIFLE criteria as well as their association with requirement for RRT and in-hospital mortality in patients with established diagnosis of tropical acute febrile illness, common being malaria, salmonellosis, dengue and leptospirosis scrub typhus in central India.

AIMS AND OBJECTIVES

The proportion of acute kidney injury in tropical acute febrile illness malwa region

To assess the etiological profile of acute kidney injury in tropical acute febrile illness

To study the outcome of acute kidney injury (In tropical acute febrile illness) with mortality and dialysis requirement

REVIEW OF LITERATURE

In a recent review, Eknoyan note that the first description of ARF, then termed ischuria renalis, was by William Heberden in 1802[3]. At the beginning of the twentieth century, ARF, then named Acute Bright's disease, was well described in William Osler's Textbook for Medicine, as a consequence of toxic agents, pregnancy, burns, trauma, or operations on the kidneys. During the First World War the syndrome was named ''war nephritis'' [4] and was reported in several publications. The syndrome was forgotten until the Second World War, when Bywaters and Beall published their classical paper on crush syndrome [5]. RIFLE criteria The Acute Dialysis Quality Initiative (ADQI) group developed a system for diagnosis and classification of a broad range of acute impairment of kidney function through a broad consensus of experts [6]. The characteristics of this system are summarized in Figure 1. The acronym RIFLE stands for the increasing severity classes Risk, Injury, and Failure; and the two outcome classes, Loss and End-Stage Renal Disease (ESRD). In a review of 10 studies, Hoste and Kellum[7] noted that patients in the Risk class defined by the creatinine criteria were more seriously ill than those in the same class defined by urine output criteria alone. Hoste and clermont G[8] observed that patients in failure based on the GFR criterion had slightly higher mortality than those in failure based on the urine output criterion. In the study of Cruz and collegues[9] RIFLE classes (creatinine and urine output criteria together) were the strongest predictors of ICU mortality. When the analysis was repeated based only on change in the creatinine criteria, RIFLE class was an independent predictor but the statistical model was inferior. When analysis was performed based only on urine output criteria RIFLE class did not emerge as an independent predictor.

MATERIALS AND METHODS

The present study was conducted at our parent institute.

Study period: October 2016 to November 2017.

Study setting

Patients admitted in medicine wards, intensive care unit, and kidney unit.

Study design: Descriptive longitudinal .

Sample size

With reference to study by Basu G *et al.* [2]incidence of AKI in TAFI was 41.1%. With precision of 20% and 95% confidence interval minimal sample size required for present study was 140. A total of 140 patients of tropical acute febrile illness (TAFI) of both the sexes were studied.

Inclusion criteria

Inpatients (aged ≥18 years) who had fever within the last 24 hour s and for less than 2 weeks, oral temperature of more than 37.5 ºc whose blood test is positive for tropical febrile illnesses [malaria (falciparum and vivax), dengue, leptospirosis, enteric fever, rickettsial fever]

Exclusion criteria

Patients with chronic kidney disease, hypertension, diabetes mellitus and all patients with renal dysfunction because of any cause other than tropical acute febrile illness (TAFI) were excluded from the study. These patients were subjected to detail history and physical examination with emphasis on symptoms and signs of tropical acute febrile illness (TAFI), renal All patients were subjected to standard protocol of clinical and laboratory assessment as follows: Investigations are as follows: Complete blood count, Peripheral smear for malarial parasite, Blood urea, Serum creatinine, eGFR (estimated Glomerular filtration rate)□□□Serum sodium, Serum potassium, Total bilirubin ,SGOT, SGPT, INR, ABG (whenever necessary), Urine output, Malarial antigen (falciparum and vivax), Leptospira IgM antibody, Dengue serology, Scrub typhus IgM antibody,□□□Enteric fever TO/TH antibody titre,□□□Ultrasound, abdomen,□□□Chest x-ray.

RESULTS

We recruited 140 confirmed cases of tropical acute febrile illnesses (TAFI) hospitalized in medicine wards, medical ICU and kidney unit from October 2016 to November 2017 and studied the occurrence of AKI in TAFI, application of RIFLE criteria for AKI classification, outcome of AKI with RRT requirement and mortality

Table-1: Distribution of patients in relation to diagnosis and aki

Diagnosis	Total Cases N=140	AKI N=39 (27.86%)	NO AKI N=101(72.14%)
Falciparum Malaria	23 (16.43%)	10 (43.48%)	13 (56.52%)
Falciparum+Vivax	9 (6.43%)	3 (33.33%)	6 (66.67%)
Vivax Malaria	12 (8.57%)	4 (33.33%)	8 (66.67%)
Leptospirosis	12 (8.57%)	5 (41.67%)	7 (58.33%)
Dengu	37 (26.43%)	10 (27.03%)	27 (72.97%)
Scrub Typhus	16 (11.43%)	4 (25%)	12 (75%)
Entric Fever	31 (22.14%)	3 (9.68%)	28 (90.32%)

Table-2: Distribution of patients in relation to total cases, total aki and rrt received

Clinical Feature	RRT	NO RRT	P-Value	Mortality	Survival	P-Value
Fever	10	130	-	16	124	-
Decreased Urine Output	9	8	<0.001,HS	7	10	0.001,HS
Breathlessness	8	8	<0.001,HS	7	9	<0.001,HS
Altered Sensorium	1	2	0.201,NS	3	0	0.001,HS
Bleeding Tendency	0	2	1.000,NS	2	0	0.012,S
Rash	1	8	0.497,NS	5	4	0.001,HS
Icterus	3	4	0.008,HS	1	6	0.581,NS
Oedema Feet	7	8	<0.001,HS	5	10	0.015,S
Pallor	0	6	1.000,NS	4	2	0.002,HS

In this study (10) patient received RRT out of (140) patient as shown in table no 24. RRT requirement was (7.14%) in TAFI patient. Out of (39) patient of AKI (10) patient received RRT, hence RRT requirement amongst AKI was (25.64%). RRT requirement was 4(17.39%) among (23) total cases of falciparum malaria and 4(40%) amongst (10) total AKI in falciparum malaria. RRT requirement was 1(11.11%) among (9) total cases of falciparum+vivax malaria and 1(33.33%) amongst (3) total AKI in falciparum+vivax malaria. RRT requirement was 0(0%) among (12) total cases of vivax malaria and 0(0%) amongs (4) total AKI in vivax malaria. RRT requirement was 0(0%) among (12) total cases of leptospirosis and 0(0%) amongst (5) total AKI in leptospirosis. RRT requirement was 4(10.81%) among (37) total cases of dengue and 4 (40%) amongst (10) total AKI in dengue. In present study most common TAFI was malarial fever 44 (31.43%), followed by dengue fever 37 (26.43%), enteric fever 31(22.14%), scrub typhus 16 (11.43%), leptospirosis 12 (8.57%). In malarial fever plasmodium falciparum (23) contributes to maximum number of cases followed by vivax malaria (12) and mixed malaria (9). In this study out of total (39) AKI patients, 25.64%(10) AKI caused by falciparum malaria, another 25.64%(10) AKI by dengue fever, 12.82%(5) AKI by leptospirosis ,vivax and scrub typhus each contribute to 10.26%(4) of AKI, mixed malaria and enteric fever each contributes to7.69%(3) of AKI. Hence maximum burden of AKI was due to falciparum malaria and dengue fever.

DISCUSSION

Tropical acute febrile illnesses such as malaria, typhoid, leptospirosis, dengue and others are a major cause of AKI in the tropics[10-11]. TAFI with Acute Kidney Injury (AKI) was a major cause of mortality [2]. Acute kidney injury (AKI) in tropics is predominantly community acquired and affects young, previously healthy and economically productive age group [8]. In a recent study from a large tertiary care hospital in South India, AKI was seen in 41.1% of patients with tropical acute febrile illness with the most common causes being scrub typhus, malaria, salmonellosis, dengue and leptospirosis [12]. We recruited 140 confirmed cases of tropical acute febrile illnesses (TAFI) includes scrub typhus, malaria, salmonellosis, dengue and leptospirosis hospitalized in medicine wards, medical ICU and kidney unit from october 2014 to november 2016 and studied the occurrence of AKI in TAFI, application of RIFLE criteria for AKI classification, outcome of AKI with RRT requirement and mortality. Above observations supported with study by Basu G *et al*. [2] where RRT requirement increased from risk to injury to failure classes (1.6%,11.8% and 45.3%, respectively) following a similar stepwise incremental risk (OR 3.4, 28.8 and 178.8, respectively). The mortality rate also increased from 2.3% in the no AKI class to 14.1%, 32.4% and 37.7% in the risk, injury and failure classes, respectively, demonstrating a significant stepwise incremental risk of mortality from risk to injury to failure classes (OR 6.9, 20.2 and 25.6, respectively, P < 0.001). Study by Nair *et al*. [9, 1] also shows among patients with AKI stage 1, 2 and 3, RRT was initiated in 3 (9.1%), 1 (3.0%) and 29 (87.9%). The increase in AKI staging is associated with increased in-hospital mortality (KDIGO, Stage 1–1 (0.17%), Stage 2–1(0.17%), Stage 3–15 (2.5%)). Similar observation that increases in stage of AKI had increased in-hospital mortality and RRT initiation was observed in other study by Thanachartwet V *et al*. An early study from

Uchino *et al*. there was a nearly linear increase in hospital mortality with increasing RIFLE class. Thakar *et al*. found that increased severity of AKI was associated with an increased risk of death independent of comorbidity.

CONCLUSION

This study entitled study of "acute kidney injury in tropical acute febrile illness" was carried out in a tertiary care centre from October 2016 to November 2017.

The aims and objectives of the study were:

- To study the proportion of AKI in TAFI.
- To assess the etiological profile of AKI in TAFI.
- 3. To study the outcome of AKI (in TAFI) with mortality and dialysis requirement

Proportion of AKI in TAFI was 27.86% in present study. Most common TAFI was malarial fever 44 (31.43%) followed by dengue fever, enteric fever, scrub typhus, leptospirosis and maximum burden of AKI was due to falciparum malaria and dengue fever. RRT requirement amongst AKI patient in TAFI was 25.64%. Mortality of patient in AKI group was significantly higher than non AKI group. Hence, AKI is a significant risk factor for mortality. RIFLE criteria are valid and applicable in AKI related to tropical acute febrile illnesses showing both an incremental risk of in-hospital mortality and RRT requirement.

Most of the AKI occurred before admission to the hospital and only minority occurred after admission. Hence measures to prevent AKI are best initiated at the community and primary healthcare level rather than at a tertiary hospital and detection of AKI in its early and potentially reversible stages to prevent its progression to kidney failure requiring dialysis, are of paramount importance.

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