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Effect Of End Stage Renal Disease And Acute Kidney Injury On ICU Patients With Sepsis

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ABSTRACT

Sepsis is described as an organ dysfunction caused by the host's negative infection response. Incidentally, kidneys are one of the most commonly afflicted organs, resulting in sepsis-associated acute kidney damage (SA-AKI), which contributes to the mortality and morbidity of sepsis patients, according to epidemiological research. The aim of this work is to assess the incidence, clinical outcomes and antibiotic sensitivity of acute kidney injury (AKI) and end stage renal disease (ESRD) patients with sepsis admitted to intensive care unit (ICU). It is a retrospective study conducted for a period of 6months. Patients with confirmed diagnosis of AKI, ESRD in accordance with risk injury failure loss end stage (RIFLE) criteria, sepsis by systemic inflammatory response syndrome (SIRS) criteria along with the positive blood culture of micro-organisms were included and patients with < 48 hours of hospitalization, covid positive patients were excluded. The mortality rate was more in septic ESRD with 90%than septic AKI (58.3%) and septic non-KI (84.3%) patients. Organ dysfunction was more in septic ESRD patients with respiratory and Multiorgan dysfunction syndrome (MODS). Even though the mortality rate and multi-organ failure was high in septic ESRD patients than septic AKI and septic non-KI patients, restoring the hemodynamic status at the earliest may prevent the organ failure.

Keywords: Mortality, renal function, multi-organ dysfunction, micro-organisms

INTRODUCTION

Sepsis is described as an organ dysfunction caused by the host's negative infection response. It is one of the primary causes of death among critically sick patients in ICUs. A recent study estimated that in 2017 there were 48.9 million cases and 11 million sepsis-related deaths worldwide, which reported for almost 20% of all total death. Septic shock is one of the major complications that could occur when sepsis worsens. This is caused by dangerously low blood pressure, which prevents oxygen from reaching the body's organs leading to death [1].

A key precipitant of AKI is sepsis, a very common condition that leads to ICU hospitalization[2,3,4].The kidneys are one of the most commonly afflicted organs, resulting in sepsis-associated acute kidney damage (SA-AKI), which contributes to the mortality and morbidity of sepsis patients, according to epidemiological research[5,6,7].Clinical risk factors, pathogenesis, treatment response, and components of renal recovery have all been illuminated by a growing body of research, advancing our ability to prevent, identify, and treat SA-AKI[8,9,10]. Regardless of these advancements, sepsis-related kidney damage continues to be a problem. Microvascular dysfunction, inflammation, and metabolic dysfunction are three essential pathways that may play a role in the development of sepsis related kidney disease, according to recent evidence[11,12]. The short-term survival of sepsis patients has improved. However, the effects of sepsis may impair a patient's long-term prognosis by reducing functional and cognitive status and quality of life, raising cardiovascular risk, and increasing the chance of long-term mortality. Long-term outcomes of patients with septic AKI have yet to be proven [7,10,13].

When compared to patients with non-septic AKI, septic AKI and septic ESRD are associated with worse outcomes, including longer hospital stays, fewer ventilator-free days, septic shock induced hypotension and greater mortality. In addition to fluid resuscitation, the vasopressor therapy is a fundamental treatment of septic shock induced hypotension to correct the vascular tone depression and improving perfusion pressure[14-19].

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PATIENTS AND METHODOLOGY

Study design and ethical consideration

This study is a single center, retrospective study approved by the institutional ethics committee (IEC) of Sri Ramachandra Institute of Higher Education and Research (SRIHER). [approval number: CSP/21/NOV/102/591]

Inclusion and exclusion criteria

Patients aged above 18 years of either gender, with confirmed diagnosis of sepsis by SIRS criteria and AKI, ESRD by RIFLE criteria along with the positive blood culture report admitted in ICU from 2017-2021 were included. Patient's with less than 48 hours of hospitalization and covid positive patients were excluded.

Data collection

Data was collected from electronic medical records after obtaining permission to access the medical records from the medical director, SRIHER. A list of patients admitted to ICU with the diagnosis of sepsis during 2017-2021 were obtained from the medical record department. From the list, patients were categorized into three groups as septic non-KI, septic AKI, septic ESRD based on inclusion and exclusion criteria. Data were collected using specially designed patient proforma.

A total of 142 patients were taken in which 33 patients were excluded due to following reasons: 14 patients due to <48 hours of hospitalization, 10 patients due to covid 19 +ve and 9 patients due to lack of culture report were excluded. Remaining 109 patients were included in the study and they were categorized into 3 groups. 51 patients were included in septic non-KI, 48 patients in septic AKI and 10 patients in septic ESRD. Data from those 109 patients were assessed and the results were generated.

This study analyses continuous variables like age, weight, sequential organ failure assessment(SOFA) score, BUN, creatinine, uric acid, urine output, glomerular filtration rate (GFR),temperature, heart rate, respiratory rate, blood pressure, partial pressure of oxygen (PaO_2),PaO_2/FiO_2ratio, partial pressure of carbon-di-oxide ($PaCO_2$), pH, lactate, hemoglobin, hematocrit, total Count, neutrophils, lymphocytes, monocytes, eosinophils, basophil, platelets, prothrombin time (PT),partial thromboplastin time(PTT), international normalize ratio(INR),c-reactive protein (CRP),erythrocyte sedimentation rate (ESR), sodium, potassium, chloride, bicarbonate, glycemic index, bilirubin total, bilirubin direct, albumin, globulin, total protein, SGOT and SGPT. Categorical variables like gender, mortality rate, organ dysfunction, cause of death, co-morbidities, micro-organisms, source of infection were also analyzed.

Statistical analysis

Analysis was performed using SPSS version. Mean ± standard deviation was given for continuous variables. ANOVA test was used to find significance for the continuous variable. Chi- square analysis was used to determine significance for categorical variables. The significant level of this study was set α=0.05.

RESULTS

Among 109 patients there were 51 patients with septic non-KI, 48 patients with septic AKI, and 10 patients with septic ESRD. There was no significant difference in baseline characteristics like age, gender, and weight. SOFA score was highly significant and it was observed that the mean score was 8.9 ±1.96 in septic ESRD patients, 6.24 ± 2.66 in septic non-KI patients and 8.2±2.98 in septic AKI patients, indicating the extent of organ dysfunction was higher in septic ESRD patients (Table1).

In mortality outcomes, patients who got expired showed a statistically significant difference among the groups and was observed more in septic ESRD patients (90%) than septic non-KI(84.3%) and septic AKI (58.3%) patients. There were no significant differences between the groups in recovery rate. Patients who got discharged against medical advice (AMA) were more in septic AKI group (33.3%) and showed a significant difference between the 3 groups. In organ dysfunction, multiple organ failure was more prevalent in septic ESRD group (70%) followed by septic non-KI (37.1%)and septic AKI(43.8%) groups. Length of hospitalization was found to have no significance when compared between groups (Table2).

Renal characteristics including BUN, serum creatinine, uric acid, GFR, urine output found to have highly significant difference ($p < 0.01$) in septic ESRD and septic AKI groups when compared to septic non-KI group. The BUN, serum creatinine and uric acid, urine output and GFR were found to have significant differences between septic ESRD group and the other two groups ($P<0.05$) (Table 3).

In Hemodynamic data, heart rate, respiratory rate, and diastolic blood pressure were insignificant whereas systolic blood pressure has a significant difference and was observed less in septic ESRD patients (103±17.81). In ventilatory data PaO2, PaCO2 and lactate have significant difference among the groups and it showed that paO2 and lactate were higher in septic ESRD patients with99.3±37.3and 5.1±1.3 respectively. Hematological variables such as hemoglobin was found to have significant difference (< 0.05) and the mean was higher in septic non-KI patients (9.8±2.15) followed by lymphocytes which was also higher in septic non-KI patients (12.6±12.6). CRP showed a significant difference among the groups and was higher in septic non-KI patients with mean of 10.5±8.5. In biochemical parameters, chloride and glycemic index was found to have significant differences among 3 groups. Liver parameter doesn't show any significance between the groups (Table 4).

Among the 3 groups, gram–ve microorganisms were found to have significant difference when compared with the other

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microorganism and septic AKI patients have higher gram-ve infection with 79% and septic non-KI patients with 64% followed by septic ESRD with 60%. In source of infection, multiple sources were found to be higher and had significant difference among the groups when compared to other sources. (Table5a).

Klebsiella pneumoniae (gram -ve) and *Staphylococcus aureus* (gram +ve) had almost equal proportion of infections in all 3 groups followed by *E. coli* (P=0.001) and *Citrobacter* (P=0.018) showed significant differences between septic non-KI and septic AKI. Fungal infections with *Candida albicans* and *Candida tropicalis* were observed which was insignificant(Table5b).

Most of the sepsis patients with *Klebsiella pneumoniae* infections are found susceptible to piperacillin-tazobactam, polymyxin B and levofloxacin. Patients with *Staphylococcus aureus* infection were susceptible to ceftriaxone and linezolid. In case of resistance to ceftriaxone and linezolid, vancomycin is prescribed. Among three groups, *Acinetobacter spp.* showed resistance to meropenem and imipenem. *E. coli* was found to be resistant to cefotaxime and imipenem in some patients (Table 6a, b).

Table 1: Baseline characteristics of the study population

S.No.	Characteristics	Septic non-KI n=51(%)	Septic AKI n=48(%)	Septic ESRD n=10(%)	P-value
1.	Age-years;Mean (SD)	59.31±15.37	56.29±16.66	47.80±14.60	NS
2.	Male	29(40.3)	35(48.6)	8(11.1)	NS
3.	Female	22(59.5)	13(35.1)	2(5.4)	
4.	Weight–Kg;Mean (SD)	65.6±8.73	65.7±5.54	68.8±5.92	NS
5.	**Mortality Prediction Score**				
	SOFA score Mean (SD)	6.24±2.66	8.2±2.98	8.9±1.96	<0.001

NS – Not significant, SOFA-Sequential Organ Failure Assessment. Weight and SOFA score were calculated by chi square method.

Table 2: Major clinical outcomes associated with septic non-KI, septic AKI and septic ESRD patients

S.No.	Outcome	Septic non-KI n=51(%)	Septic-AKI n=48(%)	Septic ESRD n=10(%)	P value
1.	**Mortality Rate**				
	Expired	43(84.3)	28(58.3)	9(90)	0.006
	Recovered	4(7.8)	4(8.3)	1(10)	NS
	AMA	4(7.8)	16(33.3)	0	0.001
2.	**Organ Dysfunction**				
	NIL	10(19.6)	17(35.4)	0	0.031
	MODS	24(47.1)	21(43.8)	7(70)	NS
	Respiratory	12(23.5)	5(10.4)	3(30)	NS
	Hepatic	1(2)	1(2.1)	0	NS
	Cardiac	4(7.8)	2(4.2)	0	NS
3.	**Length of Hospitalization**				
	≤7days	31(60.8)	27(56.3)	6(60)	NS
	>7days	20(39.2)	21(43.8)	4(40)	NS

MODS–Multi Organ Dysfunction;AMA-Against Medical Advice; Chi square test was used to calculate significance.

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Table 3: Difference in characteristics of renal function between the study groups

S.No.	Characteristics	Septic non-KI n=51(%)	Septic-AKI n=48 (%)	SepticESRD n=10 (%)	P value
1.	**BUN(mg/dL)**				
	Normal function	20 (39)	6 (13)	-	0.001
	Impaired function	31 (61)	42 (87)	10 (100)	
2.	**Sr. Creatinine(mg/dL)**				
	Normal function	25 (49)	7 (15)	-	<0.01
	Impaired function	26 (51)	41 (85)	10 (100)	
3.	**Uric acid(mg/dL)**				
	Normal function	44 (86)	34 (71)	3 (30)	<0.01
	Impaired function	7 (14)	14 (29)	7 (70)	
4.	**Urine Output**				
	>90ml/hr	3 (6)	2 (4)	-	<0.01
	50-89ml/hr	10 (20)	8 (17)	-	
	30-49ml/hr	29 (57)	26 (54)	-	
	<30ml/hr	9 (18)	12 (25)	10 (100)	
5.	**GFR**				
	≥90ml/min	19 (37)	5 (10)	-	<0.01
	60-89ml/min	7 (14)	3 (6)	-	
	30-59ml/min	12 (24)	12 (25)	-	
	15-29ml/min	10 (20)	22 (46)	4 (40)	
	<15ml	3 (6)	6 (13)	6 (60)	
6.	**Modality of RRT**				
	NIL	51(100)	23 (48)	-	-
	Hemodialysis	-	18 (38)	10 (100)	
	SLED	-	7 (15)	-	

BUN:Blood Urea Nitrogen; GFR-Glomerular Filtration Rate; RRT-Renal Replacement Therapy; SLED-Sustained Low-Efficiency Dialysis. Chi square test was used to calculate significance.

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Table 4: Physiological data of septic non-KI, septic AKI, septic ESRD patients

S.No.	Physiological data	Septic non-KI (n=51)	SepticAKI (n=48)	SepticESRD (n=10)	P value
1.	**Hemodynamic data**				
	Heartrate(bpm)	100.24±23.7	100.27±23.8	88.10±9.98	ns
	Respiratory Rate(bpm)	22.78±6.27	21.94±5.77	20.50±3.4	ns
	Systolic Pressure(mm/Hg)	103±17.81	112.8±21.1	120±23.57	0.012
	Diastolic Pressure(mm/Hg)	68.16±11.84	72.60±14.1	73±9.5	ns
2.	**Ventilatory data**				
	Pao2/Fio2(%)	150.3±91.4	150±76.3	124.2±31	ns
	PaO2(mm/Hg)	88.5±56.7	71.9±28.5	99.3±37.3	0.045
	PaCO2(mm/Hg)	43.5±18.6	34.5±13.1	40.1±13	0.022
	pH	7.3±0.162	7.1±0.48	7.2±0.14	ns
	Lactate(mg/dL)	4.3±1.42	4.7±3.01	5.1±1.3	0.044
3.	**Hematologic parameter**				
	Hemoglobin(g/dL)	9.8±2.15	9±2.12	7.6±1.58	0.007
	Hematocrit(%)	30.6±6.3	29.4±10.7	24.4±6	ns
	Total Count(cells/cu.mm)	14613.9±8483.2	16621±13314.3	15140±12086.9	ns
	Neutrophils(%)	84.6±10.42	82±13.4	87±9.3	ns
	Lymphocytes(%)	12.6±12.6	8.6±8.5	6.2±5.5	0.015
	Eosinophils(%)	0.73±0.82	1.7±4.0	0.7±0.9	ns
	Monocytes(%)	3.8±2.4	5.3±3.1	4.9±4.5	0.050
	Basophils(%)	0.26±0.22	0.33±0.32	0.22±0.22	ns
	Platelet(Lakhs/cu.mm)	1.6±1.4	1.6±1.2	1.2±0.8	ns
	PT(secs)	16±5.3	17.1±7.3	22.7±4.5	0.010
	INR	1.8±1.6	2.1±3.3	2.1±0.8	ns
	PTT(secs)	29.4±10.9	27.7±9.1	32.8±16.8	ns
	ESR(mm/hr)	28.2±14.6	35.3±12.5	19.6±1.5	0.024
	CRP(mg/dL)	10.5±8.5	7±4.8	9.5±5.9	0.049
4.	**Bio-Chemistry**				
	Sodium(mmol/L)	135±8.1	134±10.2	136.2±6.6	ns
	Potassium(mmol/L)	3.9±0.8	4.1±0.8	4.5±1.0	ns

	Chloride(mmol/L)	99.8±10.3	99.8±15.1	99.3±4.8	0.009
	Bicarbonate(mmol/L)	21.8±7.9	19.2±5.1	15.7±6.6	ns
	Glycemic Index(mg/dL)	181±78.2	192±85	219±63.9	0.036
5.	**Liver Parameters**				
	BIL(T)(mg/dL)	1.61±1.6	4.8±8.9	3.8±7.5	ns
	BIL(D)(mg/dL)	0.8±0.9	3.0±6.2	2.6±5.1	ns
	SGOT(U/L)	250±978.5	511±1562	87.3±115	ns
	SGPT(U/L)	72.2±116.6	151.4±311.2	35.7±52.8	ns
	T. Protein(g/dL)	5.6±0.1	5.7±1.03	5.4±0.9	ns
	Albumin(mg/dL)	2.5±0.6	2.6±0.65	2.5±0.8	ns
	Globulin(mg/dL)	3.0±0.7	2.9±0.7	7.7±15.2	ns

Pao2-Partial pressure of Oxygen;FiO2-Fractioned of Inspired Oxygen; PaCO2-Partial pressure of Carbon dioxide; PT- Prothrombin Time; PTT-Partial Thromboplastin Time INR-International Normalized Ratio;ESR-Erythrocyte Sedimentation Rate;CRP-C-Reactive Protein.

Table 5(a): Micro-organisms and source of infection in study population

S.No.	**Parameters**	**Septic non-KI n=51(%)**	**Septic AKI n=48(%)**	**Septic ESRD n=10(%)**	**Pvalue**
1.	**Blood culture**				
	Gram +ve	27(52)	25(52)	5(50)	ns
	Gram -ve	33(64)	39(79)	6(60)	0.025
	Fungal	3(5)	-	1(10)	NS
2.	**Source of infection**				
	Pulmonary	6(12)	2(5)	1(10)	NS
	Urogenital	3(6)	3(6)	-	NS
	Skin/bone	1(2)	-	-	NS
	IV device	15(29)	12(25)	1(10)	NS
	Multiple	17(33)	16(33)	8(80)	0.031
	Unknown	9(18)	15(31)	-	NS

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Table 5(b): Major causative micro-organisms in septic non-KI patients in percentage

S.No.	Micro-organism	Species	Septic non-KI n=51(%)	Septic AKI n=48(%)	Septic ESRD n=10(%)	P value
1.	*Klebsiella pneumoniae*	-ve	17(33)	16(33)	5(50)	NS
2.	*Acinetobacter species*	-ve	10(20)	8(17)	3(30)	NS
3.	*Staphylococcus aureus*	+ve	19(37)	16(33)	3(30)	NS
4.	*Enterococcus faecalis*	+ve	9(18)	6(12)	2(20)	NS
5.	*Escherichia coli*	-ve	1(2)	13(27)	1(10)	0.001
6.	*Staphylococcus hemolyticus*	+ve	3(6)	-	-	NS
7.	*Enterobacter species*	-ve	2(4)	5(10)	-	NS
8.	*Citrobacter species*	-ve	8(16)	1(2)	-	0.018
9.	*Candida tropicalis*	Fungi	3(6)	-	-	NS
10.	*Candida albicans*	Fungi	2(4)	-	-	NS
11.	*Staphylococcus epidermidis*	+ve	1(2)	-	-	NS
12.	*Pseudomonas aeruginosa*	-ve	-	2(4)	-	NS
13.	*Providencia rettgeri*	-ve	-	3(6)	1(10)	NS
14.	*Streptococcus pneumoniae*	+ve		4(8)	-	NS

Table 6(a): Antibiotic sensitivity to micro-organisms in study population

S.No	Organism	Broad spectrum Antibiotics				Narrow spectrum antibiotics		
		P+T	Mer	L. flox	C. flox	Lin. z	Pol. B	Col.
1	Kleb. pneu	*25	-	*15	*12	-	*9	*4
2	Acin. Spp	*5	-	*17	-	*8	*17	*3
3	S. aureus	*17	*15	-	-	*22	-	-
4	E. coli	*13	*3	*2	*14	*3	*1	*2
5	Ent. Face	*8	*12	-	*7	*9	*5	*10

Microorganisms-Kleb. pneu-*Klebsiella pneumoniae*, Acin. spp- *Acetinobacter species*, S. aureus-*Staphylococcus aureus*, E coli-*Escherichia coli*,Ent. faec-*Enterococcus faecalis*

Antibiotics-P+T-Piperacillin+tazobactam,Mer-Meropenem,L. flox-Levofloxacin,C. flox-Ciprofloxacin, Lin.z-Linezolid,Pol. B-PolymyxinB,Col-colistin

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Table 6(b): Antibiotic resistance to micro-organisms in study population

S.no	Organism	Broad spectrum Antibiotics				Narrow spectrum
		Meropenem	Cefotaxime	Amikacin	Imipenem	Vancomycin
1	Acin. spp	*4	-	*1	*3	-
2	E. coli	-	*6	-	*3	-
3	Prov. spp	*1	*1	*1	-	-
4	Str. pneu	-	-	-	*2	*1
5	Cit. bac	-	-	*1	-	

Microorganisms: Acin. spp-*Acinetobacter species*, E. coli-*Escherichia coli*, Prov. spp-*Providencia species*, Str. pneu-*Streptococcus pneumoniae*,Cit. bac-*Citrobacter species*

DISCUSSION

In broad terms, sepsis is the body's inflammatory reaction to microbial invasion which has developed to resist and stop the spread of infection leading to intricate immunological, coagulation, and circulatory alterations that could cause septic shock which is characterized by organ dysfunction and failure. [20]. The aim of this study is to distinguish the effect of end stage renal disease and Acute Kidney Injury in ICU patients with sepsis. This study differentiates the clinical outcomes among the study population with septic non-KI, septic AKI and septic ESRD.

A Retrospective study was undertaken in 109 patients with septic non-KI, septic AKI, septic ESRD. All the 109 patients in this study were clinically categorized into septic non-KI (47%), septic AKI (44%), septic ESRD (9%). The data of the 3 groups were clinically diverse, with many identifying characteristics, and their outcomes differed depending on the presence or absence of renal disease. This study has predominantly higher male population complying with the previous studies.

The SOFA (Sequential Organ Failure Assessment) score was significantly higher in the septic ESRD and septic AKI groups. This finding was parallel to the previous study by Wang H *et al*[21] concluded that the SOFA score was elevated and was more accurate in predicting mortality in critically ill septic AKI and septic ESRD patients. (Table1).

The current study identified that73% of total patients expired during the ICU hospitalization and observed inordinate mortality rate in septic ESRD (90%) contrasted the finding of the prior study conducted by Jeganathan *etal.* with 30.2% of mortality in septic AKI and 6% in septic ESRD study group [4]. Organ dysfunction is a major hallmark of sepsis. MODS (multi organ dysfunction syndrome) was more prominent under which respiratory organ dysfunction was distinct. This finding was similar to the study conducted by Mercedes Ibarz *et al* which depicted cardiovascular and respiratory dysfunction as more common. Length of hospitalization of sepsis patients admitted to ICU with AKI and ESRD were recorded. Apparently, it had no significant role in mortality outcomes.[22] (Table 2).

Similar to the established fact, septic ESRD patients had GFR of less than 15 ml/min. This finding was identical to the study conducted by Ralphe Bou Chebl *et al.* concluded that renal parameters showed significant differences between the study groups. [12](Table:3)

In Acute kidney injury and End stage renal disease, Renal Replacement Therapy (RRT) is crucial for the body to survive displacing metabolic derangements. Majority of septic AKI and septic ESRD underwent hemodialysis and 15% of septic AKI underwent SLED (Sustained Low-Efficiency Dialysis) and it was similar to the study conducted by Sean M. Bagshaw *et al.* which concluded the same [5].In septic ESRD, all patients underwent hemodialysis and mortality rate was 90%. Thus, this study admits insignificant association between dialysis and recovery rate (Table3).

Hemodynamic data like systolic blood pressure had a significant difference in septic ESRD than the other 2 groups whereas diastolic blood pressure did not vary. In ventilatory data, PaO2, PaCO2 had significant difference among the study groups. This finding was similar to the study conducted by Eric A.J. Hoste *et al.* concluded that PaO2, PaCO2 had a significant difference among septic AKI and septic non-KI[23]. Glycemic index was higher in septic ESRD than the other two groups. (Table4).

Micro-organisms are the key component to sepsis. This study recorded observed more gram –ve infections than the gram +ve infections. Out of all the microorganisms *Klebsiella pneumoniae* and *Staphylococcus aureus* (gram+ve) had equal proportions of infection rate among three groups. Both septic AKI and ESRD had more incidence with *Klebsiella pneumonia* than with the other micro-organisms. This finding was contrast to earlier studies conducted by Jeganathan *et al.* concluded that gram +ve bacteria is more predominant in causing sepsis. This study suggests that there are multiple

sources of infection causing sepsis which was similar to the study conducted by Jeganathan *et al.* concluded IV devices as a major source of infection.[4] (Table5a,5b).

Both broad and narrow-spectrum antibiotics were prescribed in all three groups. Most of the septic patients with *Klebsiella pneumoniae* are more susceptible to piperacillin- tazobactam, polymyxin B and levofloxacin. *Staphylococcus aureus* is more susceptible to ceftriaxone, linezolid. Among three groups, *Acinetobacter spp*. Showed more resistance to meropenem and imipenem. *E.coli* is more resistant to cefotaxime and imipenem (Table6a,6b).

Apart from the antibiotics, studies have suggested that rapid hemodynamic optimization with timely vasopressor delivery is necessary in order to minimize the risk of potentially life-threatening septic shock induced hypotension [24,25].

Limitations of this study is that, itis a retrospective data which restricted us to assess the quality of life of patients who got recovered and were discharged against medical advice. This study excluded covid positive patients with sepsis which limited us to know the covid infection impact in our study group.

CONCLUSION

This study concludes that the incidence of AKI is quite common in patients with sepsis admitted in ICU. The mortality rate and multi-organ failure was high in sepsis ESRD group when compared to sepsis AKI and sepsis non-KI group. There was no major difference seen in physiological data among the study groups. Restoring the hemodynamic status at the earliest may prevent the organ failure. Hemodynamic resuscitation, microorganism specific and other additional therapies will be needed to prevent the development of multi organ failure in the course of sepsis.

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