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TO STUDY THE COMMON MICROORGANISM CAUSING SEPTICAEMIA WITH RENAL INVOLVEMENT .

Microbiology

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ABSTRACT

Sepsis syndrome is very often associated with a downward spiral through a spectrum of systemic of systemic inflammatory response syndrome (SIRS) culminating in organ failure and death. **Aims and Objective:** To study the common micro-organism in sepsis syndrome. **Materials Sand Methods:-** Fifty patients of septicaemia with renal involvement were studied in the department of Microbiology, Darbhanga medical college, Darbhanga from July 2019 to June 2020. **Results:** Blood culture is positive in 60% patients and negative in 40% of patients. Organisms isolated were *staphylococcus aureus* (33.3%) followed by *acinetobacter* (20%), *enterobacter* (13.3%), *salmonella typhil* (13.3%), *candida* (6.6%), *streptococci* (6.6%) and *E-coli (*3.7%), *Klebsiella* (3.3%) were less commonly isolated. **Conclusion:** Blood culture postivitiy in not a per-requisite for sepsis syndrome and *staphylococcus aureus, acinetobacter, enterobacter and salmonella typhi* are commonly associated organisms with sepsis induced AKI.

KEYWORDS

Blood Culture, Sepsis syndrome.

INTRODUCTION:-

Sepsis syndrome is very often associated with a downward spiral through a spectrum of systemic of systemic inflammatory response syndrome (SIRS) culminating in organ failure and death[1]. They are frequently encountered disorders in critical care environment and are associated with increased morbidity and mortality[2,3,4]. The mortality in sepsis syndrome increases as SIRS progress to an established state of shock associated with failure of an increasing numbers of organ systems[1].

Spesis and particularly septic shock are important risk factors for the development of acute kidney injury (AKI). AKI in sepsis is generally not an isolated event but often a component of the multiple organ dysfunction syndrome (MODS) that may complicate sepsis[5].

Complicating AKI in sepsis adversely affects the outcome [1,5,6]. Preexisting renal insufficiency also serves as a common risk factor in the development of AKI in sepsis syndrome [6]. It is of interest to note that while survival form isolated AKI has improved, mortality rates over the last 30 years, despite significant improvements in resuscitation and renal supoort[5]. The greatest risk of developing severe sepsis occurs in the setting of bacteraemia associated with noscomial pneumonia. Patients with intra-abdominal infections and polymicobial bacteraemia or postoperative wound infection and bacteraemia are at significant risk for severe sepsis. Only 30-50% of patients with sepsis have positive blood culture results. Gram negative bacteria as a goup continue ot cause more deaths from sepsis. Blood stream infections caused by pseudomonas aeruginosa, candida albicans and multidrug resistant enterococcus faecaeum is associated with increased mortality[7]. Sepsis syndrome is a multisystem response to infection or injury ranging from sepsis to septic shock to MODS. The occurrence of sepsis syndrome is the result of a complex interaction in the balance between the proinflammoatory and the anti inflammatory responses (immunological dissonance)[8].

MATERIALS AND METHODS:-

The present was conducted in the department of Microbiology, Darbhanga medical college, Darbhanga from July 2019 to June 2020. The diagnosis was based on detailed history and KFT analysis. Five ml blood sample was collected from each adult, aseptically using 70% alcohol and 2% tincture of iodine and inoculated immediately into 50ml Brain Heart Infusion (BHI) Broth with 0.025% of sodium polyanethol sulphonate as anticoagulant. Negative result was followed by examining the broth daily for the sign of bacterial growth (turbidity, haemolysis, clot formation) and by doing final subculture at the end of seventh day. Bottles that showed sign of growth were further processed by Gram stain, followed by subculture on Blood agar, Mac Conkey agar, Manitol salt agar and examined after 18-24 hrs of incubation. Bacterial isolates were identified by colony morphology, Gram staining, catalase test, coagulase test, oxidase test, methyl red/voges-proskauer test (MR-VP), Triple sugar iron agar test, citrate utilization test, Urease test and Sulfur Indole Motility (SIM) test using standard procedure for bacterial identification. Antibiotic Sensitivity Test was performed on Muller-Hinton Agar, blood agar and MacConkey Agar plates by Kirby-Bauer disc diffusion methods.

RESULT: 50 patients of septicaemia with renal involvement were studied. Their age distribution is as follows.

Table-1 (age Distribution

Age (years)	No. Of patients (n=50)	Percentage of Patients (%)
15 – 30	9	18
31 – 45	15	30
46 – 60	13	26
>60	13	26

3.% of patients belonged to the age group of 31-45 yrs. While 26% of patients were in the age group of 40-60 yrs;. and 26% were above the age of 60 yrs. 18% of patients belonged to the age group of 15-30 yrs.

Table-ii (sex Distribution)

Sex distribution of 50 septicaemic patients with renal involvement is as follows.

Age (years)	No. Of patients (n=50)	Percentage of Patients (%)
Male	35	70
Female	15	30

There was a male preponderane found with the M : F ratio being 2.3:1

TABLE-IV : TABLE-III (Focus of infection in subgroups of sepsis syndrome)

The focus of infection was determined and studied in patients belonging to various subgroups of sepsis syndrome and results are as follows.

Focus of infection	Sepsis syndrome subgroups					
	Sepsis/ SIRS (n=19)	Severe Sepsis/ Severe SIRS (n=2)	Septic Shock/ SIRS shock (n=15)	MODS (n = 2)	Refractory septic shock (n=12)	Total (n=50) (%)
Orodental			1			1[2]
Intra-abdominal	1		3		6	10[20]
KidneyUrinary tract	8		3			11[22]
Skin/soft tissue	6	1	1		3	11[22]
Respiratory tract	3	1	6	1	2	13[26]
OBGY infection	2	1	1		1	5[10]
Post operative			2		2	4[8]
Unknown				1	1	2[4]
More than one site	1	1	2		3	7[14]

The commonest source of infection was respiratory tract (26%)

followed by kidney and Urinary tract (22%) and skin and soft tissue (22%). This was followed by intra-abdominal causes (20%), OBGY causes (10%), post operative (8%), orodental (2%) were the less common source of infection. The focus of infections was not known in 4% of patients and 14% of patients had more than one site as a source.

Table-iv : blood culture findings in sepsis syndrome

Blood culture findings in sepsis syndrome in the patients are as follows :'

Blood culture	N=50 [%]
Positive	30 [60]
Negative	20 [40]

Blood culture is positive in 60% patients and negative in 40% of patients.

Table – V : Common Organisms Isolated In Sepsis Syndrome

Common organisms isolated in sepsis syndrome are studied as follows:-

Microorganisms	Number (n=30) [%]
Staph-aureus [MSSA+MRSA)	10 [33.3]
Enterobactor	4 [13.3]
Candila	2 [6.6]
Acinetobacter	6 [20]
E.Coli	1 [3.3]
Klebsiella	1 [3.3]
S.Typhi	4 [13.3]
Streptococci	2 [6.6]

Organisms isolated were *staphylococcus aureus* (33.3%) followed by *acinetobacter* (20%), *enterobacter* (13.3%), *salmonella typhil* (13.3%), *candida (*6.6%), *streptococci* (6.6%) and *E-coli* (3.7%), *Klebsiella* (3.3%) were less commonly isolated.

DISCUSSION:-

In the present study, 50 patients of sepsis syndrome with renal involvement were studied. The mean age (in years) was 44.4 with an age range of 15 to 80 years, with male; female ratio being 2.3:1 A Study by Karnik A.M et al[20] has also reported a male predominance in their study of 35 patients with systemic inflammatory response syndrome (SIRS), especially below the age of 40 years. They have concluded that premenopausal women seem to be protected[9].

The commonest focus of infection in the present study was respiratory tract (26%) followed by kidney and urinary tract (22%) and skin and soft tissue (22%). This was followed by intra-abdominal causes (20%), OBGY infection (10%) and postoperative causes (8%), Orodental (2%) was the least common source of infection. This report is in accordance with the National Nosocomial Infections Surveillence (NNIS) system report (1992 to 1997) where nosocominal pneumonia was ranked second most common hospital acquired infection just behind the urinary tract infection and both types of infection are frequent causes of sepsis due to gram negative bacteria[2]. Patients having refractory septic shock had higher prevalence of intra-abdominal (50%) and multiple sources (25%) of infection as compared to those with sepsis/SIRS (4.2% each) while the prevalence of kidney and urinary tract as a source of infection was lower (0%) in refractory septic shock as compared to those with sepsis SIRS (42.1%). This is in accordance with a higher prevalence of intra-abdominal (28%) and multiple sites of infection (7%) in severe sepsis compared to those with sepsis (15% and 1% respectively) and a lower prevalence of urinary tract source (12%) in severe sepsis as compared to (25%) in sepsis reported by B. Buisson et al[12] in their study.

Skin and peritoneal infections were also reported as more common source of infection for patients with SIRS and AKI by Karnik A.M et al[10],[11].

Blood culture was positive in 60% and negative in 40% of patients in the present study. This report is supported by the fact that blood stream infection is not a prerequisite for the development of septic shock and only 30-50% of patients with sepsis have positive blood culture result in a study by David Simon et al[13],[14].

R.B. Stott et al[16] reported 72% blood culture positively in their patients with sepsis syndrome.

Staphylococcus aureus was the commonest organism isolated (33.3%) followed by *acinetobacter* (20%), *enterobacter* (13.3%) and *salmonella typhi* (13.3%), *candida (*6.6%), *streptococci* (6.6*%), E-coli* (3.3%) *and klebsiella* (3.3%) were less commonly isolated *Enterococci* (16%), *staphylococcus aureus* (13*%), candida* (6%) *klebsiella* (4%) were the common organism isolated from blood stream as per the National Nosocomial Infections Surveillance Report (1992-1997)[2]. Of the various types of renal failure studied in patients with sepsis syndrome, intrinsicrenal injury (54%) was commonly encountered followed by pre renal (26%) and AKI on CKD (20%).[15] This can be partly explained by the fact that sepsis affects renal function not only by it's systemic hemodynamic effects but also by directly causing an imbalance between the vasodilatory and vasoconstrictory substances locally in the kidney with the aid of myriads of soluble mediators thereby profoundly declining the renal blood flow[16]. These mediators also have a direct toxic effect on renal tubular cells 11. Also most of the patients were from medical intensive care unit and were critically ill for a longer time prior to admission thereby might have already progressed from pre-renal to intrinsic renal failure on admission. Nephrotoxic drugs might have added to the intrinsic renal injury in 12 patients who received them.

CONCLUSIONS:-

Males predominate females by a ratio of 2.3:1 in developing sepsis induced AKI however mortality remains uninfluenced by sex. Age above 60 is associated with increased risk of developing sepsis induced AKI and is also associated with a higher mortality due to same. Respiratory tract, kidney and urinary tract, skin and soft tissue and intraabdominal infection sites are common focus of infection and intraabdominal infection, multiple foci of infection were the more prevalent in patients with refractory septic shock, kidney and urinary tract infection was more prevalent in patients with sepsis. Intrinsic renal failure is the commonest type of renal failure in sepsis syndrome. Complicating AKI increases the mortality in patients with sepsis syndrome.

Mortality increases with increasing severity of renal failure as indicated by a serum creatinine above 3 dmg./dl. Diabetes mellits, hypertension, older age (>60 years), pre-existing CKD, nephritic syndrome, HIV infection, malignancy and nephrotoxic drug intake were important risk for the development of sepsis, AKI or both. Blood culture postivitiy in not a per-requisite for sepsis syndrome and *staphylococcus aureus, acinetobacter, enterobacter and salmonella typhi* are commonly associated organisms with sepsis induced AKI. Refractory septic shock had a greater mortality compared to septic shock inturn compared to sepsis/SIRS. Organisms isolated were *staphylococcus aureus* (33.3%) followed by *acinetobacter* (20%), *enterobacter* (13.3%), *salmonella typhil* (13.3%), *candida (*6.6%), *streptococci* (6.6%) and *E-coli* (3.7%), *Klebsiella* (3.3%) were less commonly isolated.

REFERENCES:-

1. BREEN D and BIHARI D in acute renal failure as a part of multiple organ failure, the slippery slope of critical illness. Kidney international vol. 53; supplement 66 (2008), s-25 to s-33.
2. BALK R and LARRY C. In severe sepsis and septic shock, definition, epidemiology and clinical manifestations, critical care clinics vol. 16, April 2000; 179-192.
3. BALK R and BONE RC in the septic syndrome, definition and clinical implication critical case clinics vol. 5;2009, 1-8.
4. BONE RC in the pathogenesis of sepsis annals of int. Medicine vol. 115; 1991, 457-469.
5. ABEL THIJS and LAMBERT THIJS in pathogenesis of renal failure in sepsis kindney international vol. 53, suppl. 66;1998, s-34 to s-37.
6. SHMVELY H., PITLIK S, DRUCKER. M, SAMRA Z, KONISBERGER H, LEIBOVICI L in predicting mortality in patients with bacteraemis, the importance of pre-existing renal insufficiency Renal failure 22 (1) Jan 2000, 99-108.
7. BONE RC, BALK RA, CERRA FB et al American College of chest physicians / society critical case medicine consensus conference definitions for sepsis and organ failure and guidelines for the use of innovative therapies in sepsis chest 101; 2002, 1644-1655.
8. ROBET MUFORD in sepsis and septic shock Harrisons principals of int, medicine eds. Braunwald, Facici, Kasper, Hauser, Longo, Janeson 16th edition vol. 1; 2004.
9. U.N. DAS Update article in recent advances in pathobiology of septicaemia and septic shock JAPI vol. 18; no. 12,2000, 1181-1184.
10. ALAN FEIN, MYLENE. G. COLUCCE in acute lung injury and acute respiratory distress syndrome in sepsis and septic shock critical care clinics vol. 16; no. 2 April 2000, 289-317.
11. H ANDREAS BOCK in pathophysiology of ARF in septic shock from pre-renal to renal failure, kindeny int vo. 53, suppl. 64;2018, s-15 to s-18.
12. LARRY COSEY in immunological response to infection and it's role in septic shock in eds Richard W.C. Michael A.G. critical care clinics vol. 16; no. 2,193-213.
13. BATES D. SANDS, K. MILLER E et al predicating bacteraemia in patients with sepsis syndrome. Journal of infectious disease 176; 2017, PP 15-38.
14. SIMOND and TRENHOLME G. From antibiotics selection for patients with septic shock, critical care clinics vol. 16: no. 2, April 2000, PP 215-223.
15. NICHOLAS P. CUAZEN and TIMOTHY W. EVENS in endothelin and vascular response to sepsis Recent advances in critical care medicines vol. 115; 2018, 68-89.
16. GLOVANNI C, CLANUFIOR, GLUSEPPE M and GLUSEPPE P. In role of soluble mediators in sepsis and renal failure kidney international vol. 53; suppl. 66, 2020, s-38 to s-42.