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Original Research Paper

Microbiology

BLOOD STREAM INFECTIONS IN INFANTS IN A TERTIARY CARE CENTER, TAMIL NADU, INDIA

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ABSTRACT

Background: Blood stream infections are associatedwith high morbidity and mortality Early diagnosis and prompt treatment will help to control the infection at an early stage.Prevalence and antimicrobial susceptablity of microorganisms vary depending on the geography and use of antibiotics.

Objective: To know the aetiological agents causing blood stream infection in infants treated at GovtTheniMedical College, Theni and the antibiotic susceptibility pattern.

Materials and methods: Blood samples were collected from all suspected cases attending Government Theni Medical College,from January 2015 to August 2017.The isolated strains were identified by standard laboratory procedures. The Antibiotic susceptibility was tested by Kirby Bauer disk diffusion method.

Result: Out of 1734 samples analyzed932 (53.75%)were culture positive. coagulase negative staphylococcus was the predominant pathogen isolated ,followed by Klebsiellaspecies andNon fermentive GNB. The gram positive pathogens were susceptible to Linezolid,Vancomycin, Teicoplaninand Clindamycin. The gram negative pathogens were sensitive to Tigecyclin,Colistin,Eratapenem andAmikacin .

Conclusion: This study show the need for continued screening and surveillancein routine blood culture,thereby we can know the common pathogens prevalent in the area and empirical therapy for blood stream infections.

KEYWORDS :

Introduction:

Blood stream infections are defined as the presence of viable infectious microorganism in the blood stream causing illness (1)They are among the leading cause of morbidity and mortality worldwide .Increased incidence was found in extreme ages of life due to poor immune competency and presence of co morbid conditions. The management is often empirical, due to lack of standard guidelines and non availablity of Antibiotic Susceptibil itypattern of local isolates.(2) There is an increased trend of drug resistance is also observed. Hence an early initiation of appropriate antimicrobial treatment is the need of the hour in decreasing the morbidity and mortality. It is necessaryfor a common protocol that while guide the treating physician the pathogens prevalent in the particular area and their sensitivity pattern.

Materials and methods:

The study was carried out at Government TheniMedical College from January 2015 to August 2017.The samples were collected from infants less than one year of age admitted at GTMCPaediatric department with symptoms of blood stream infection .The samples were collected in Brain heart infusion broth. The collected samples were incubated aerobically at 37°C .Sub cultures were done in MacConkey agar and Blood agar after overnight incubation and 48 hrs and 72 hrs. The Antibiotic susceptibility test was done by using modified Kirby Bauer method .The zone sizes were measured and interpretedaccording to CLSI guidelines.

Results:

Out of the 1734 samples tested 940(54%) ,were bacteriologically positive.Among the pathogens which were isolated435(46.25%) were gram positive cocciand 505(53.75%) were gram negative bacilli. In the gram positiveisolates Coagulase negative staphylococcus was the predominant pathogen, followed by Klebsiella pneumonia and Non fermentive gram negative bacteria.

Table:1 Organisms isolated:

Organism	2015	2016	2017	Total	Percentage
Candida	8	4	6	18	2
Citrobacter	5	10	9	24	3
Edwardsiella	1	1	2	4	0.5
Enterobactersp	3	6	3	12	1
Enterococci	25	28	13	66	7
Escheritia coli	10	17	4	31	3
Klebsiella species	**24**	**68**	**77**	**169**	**18**
NF gnb	**32**	**76**	**25**	**133**	**14**
Proteus sp	2	4	2	08	1
Pseudomonas	18	10	1	29	3
Salmonella species	1	0	0	1	0
Serratia species	0	1	0	1	0
Staphylococcus aeureus	6	17	4	27	3
Coagulase negative staphylococcus	**96**	**242**	**68**	**406**	**43**
Streptococcus species	1	1	0	2	0
No growth	342	327	133	802	46
TOTAL	**574**	**812**	**348**	**1734**	----

Table :2 Antibiotic sensitivity pattern of Gram positive isolates:

ANTIBIOTIC	Number	R (%)	I (%)	S (%)	R (%) C.I.(95%)
Penicillin G	407	95.1	0	4.7	92.4-96.9
Ampicillin	409	96.1	0	3.9	93.6-97.7
Oxacillin	400	69.8	5.2	10.5	65.0-74.2
Cefazolin	355	80	0.8	19.2	75.4-84.0
Cefuroxime	255	78	6.7	14.9	72.3-82.8
Cefotaxime	402	77.9	3.7	18.4	73.5-81.8
Cefepime	435	77.2	3.2	19.5	72.9-81.0
Cefoxitin	354	78.8	0.3	20.9	74.1-82.9
Gentamicin-High	6	33.3	0	66.7	6.0-75.9
Gentamicin	432	53.2	6.7	40	48.4-58.0

Ciprofloxacin	465	67.7	12.5	19.8	63.2-71.9
Levofloxacin	431	57.1	22.3	20.6	52.3-61.8
Trimethoprim/Sulfamethoxazole	439	56.5	9.3	33.7	51.7-61.2
Clindamycin	442	20.8	9.7	69.5	17.2-24.9
Erythromycin	449	37.9	35.4	26.7	33.4-42.6
Linezolid	**453**	**0.7**	**0.2**	**99.1**	**0.2-2.1**
Vancomycin	**457**	**0**	**0.2**	**99.3**	**0.1-1.7**
Doxycycline	**434**	**7.6**	**4.6**	**87.8**	**5.4-10.6**
Tetracycline	395	18	6.8	75.2	14.4-22.2

Most of the gram positive isolates were resistant to the commonly used Antibiotics. The Gram positive isolates were sensitive to Linezolid ,Vancomycin, Doxycylin.

Table:3 Antibiotic sensitivity pattern of Gram Negative isolates:

Antibiotic name	Number	R (%)	I (%)	S (%)	R (%) C.I.(95%)
Ampicillin	333	93.1	4.2	2.7	89.7-95.5
Piperacillin	269	81.4	10.4	8.2	76.1-85.8
Amoxicillin/Clavulanic acid	373	83.6	3.8	12.6	79.4-87.1
Piperacillin/Tazobactam	380	30	15	55	25.5-34.9
Cefazolin	278	92.4	1.4	6.1	88.5-95.1
Cefuroxime	221	82.4	3.2	14.5	76.6-87.1
Ceftazidime	270	61.9	11.9	26.3	55.8-67.7
Cefotaxime	340	85.6	5.9	8.5	81.3-89.1
Cefepime	302	48	8.6	43.4	42.3-53.8
Cefoxitin	253	70	4.3	25.7	63.9-75.5
Aztreonam	349	65.3	14.9	19.8	60.0-70.2
Doripenem	**139**	**28.8**	**10.8**	**60.4**	**21.6-37.2**
Ertapenem	313	53.7	7.3	39	48.0-59.3
Meropenem	**326**	**28.2**	**11.3**	**60.4**	**23.4-33.5**
Amikacin	**396**	**30.1**	**7.6**	**62.4**	**25.7-34.9**
Gentamicin	343	48.1	6.4	45.5	42.7-53.5
Nalidixic acid	288	63.9	20.5	15.6	58.0-69.4
Ciprofloxacin	384	38	13.8	48.2	33.2-43.1
Gemifloxacin	275	37.8	15.6	46.5	32.1-43.8
Levofloxacin	364	25.5	23.4	51.1	21.2-30.4
Ofloxacin	330	33	17.6	49.4	28.0-38.4
Trimethoprim/Sulfamethoxazole	354	55.6	4.5	39.8	50.3-60.8
Colistin	**375**	**9.3**	**0**	**90.7**	**6.6-12.8**
Doxycycline	357	28.6	9.8	61.6	24.0-33.6
Tetracycline	303	48.2	7.9	43.9	42.5-54.0
Tigecycline	**269**	**7.1**	**5.6**	**87.4**	**4.4-11.0**

The gram negative isolates were sensitive to Colistin ,Tigecyclin, Amikacin , Doripenem and Meropenem.

Discussion :

Blood stream infection is a challenging problem and sometimes it may be life threatening many studies have been done in this area shows early antimicrobial therapy can reduce the morbidity and mortality .Septicemia being common in both extremes oflife.

This study deals with the common age group affected, from birth to one year. Here the positivity is higher compared to other studies.A study from Nepal showed a positivity of 10.28%(3).and another study from Nepal showed a positivity of 12.6%(4).Our study showed a positivity of 54%.However studies done in Rajasthan also shows a higher incidence 31.2% . Studies done by Viswanathan et al from Kolkatayielded a positive result of 46.3%. (5)Higher positivity in our study may be due to the age group selected ie less than one year.The variation in blood stream infection rates among these studies may be attributable to sampling volume of blood culture,culture systemand medium formulation as well as type of patients enrolled in the study.

In this study the maximum number of positivity was observed in the newborn who are much prone for sepsis. The gram positive organism outnumbered the gram negative pathogens.Similar reports have been obtained from shretha et al from Nepal and Arora and Devi from India.(6,7) The commonest gram positive cocci isolated was coagulase negative Staphylococci. Among the gram negative pathogens Klebsillae pneumonia is the predominant followed by non fermentive GNB. This is similar to the study of Army Medical College, Rawalpindi(8).Whereas other studies show a predominance of Staphylococcusaeureus, followed by Gram Negative BacilliE.Coli and Klebseilla species.(9)The Antibiotic susceptablity pattern of the gram positive isolates showed sensitive to Linezolid, Vancomycin, Doxycylin. Most of the isolates were resistant to commonly used Antibiotics.This is consistent with the study of Fayyaz and et al (10)and Marshall et al 1998(11)The gram negative isolates were sensitive to Colistin, Tigecyclin ,Pipercillin, Tazobactum, Doripenemand Meropenm. The changing spectrum of microbial resistanceto the commonly used antibiotics suggest the need for of continuoussurveillance. This will help the treating physician the antibiotic that are to be used to control blood stream infections.

Conclusion:

This study provides some insight into the local trends and bacterial etiology of bloodstream infections among pediatric patients. Gram positive bacteria are the major contributors of BSI in our patients. A higher rate of antimicrobial resistance among gram negative and gram positive organisms is an alarming issue. Exact contributing factors for the bloodstream infections (BSI) within these groupsie infants need to be further elucidated. Rational use of antibiotics, formulation of antibiotic policy, and prompt therapy of bloodstr eam infections for the effective management and prevention of drug resistance are urgently needed in our setting.

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