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TO STUDY THE BACTERIOLOGICAL PROFILE OF COMMUNITY ACQUIRED AND HOSPITAL ACQUIRED NEONATAL SEPSIS AND TO STUDY THE SENSITIVITY OF THE CAUSATIVE ORGANISMS TO ANTIBIOTICS

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ABSTRACT

Background: Neonatal septicemia or sepsis neonatorum refers to systemic infection of the new born. It is a clinical syndrome of systemic illness accompanied by bacteremia occurring in the first month of life. Prompt recognition, appropriate antimicrobial therapy and judicious supportive care are the key determinants of positive outcome in this serious pediatric emergency. Sepsis is the commonest cause of neonatal mortality and is probably responsible for 30% - 50% of the neonatal deaths each year in developing countries. The reported incidence of neonatal sepsis is 38 per 1000 live births in Asia. The incidence is lower in western countries. According to Neonatal Perinatal Database (NNPD) last reported data collected in 2002-2003 from 18 various parts of India, the incidence of neonatal sepsis has been reported to be 29 per 1000 live births. According to WHO estimates, there were about 5 million deaths in 1995, 98% of them occurred in developing countries. The number of deaths decreased to 4 million in 2005, but among them 98% still occurred in developing countries. In developing countries neonatal mortality from all the causes are about 34 per 1000 live births, most of the deaths occurring in the first week of life and most of them on the first day. In contrast in the developed world it is only five per 1000 live births. **Methods:** This study was a prospective observational study in neonatology section of Post Graduate Department of Pediatrics at GB Panth hospital, an associated tertiary care pediatric hospital of Government Medical College Srinagar, Northern India, from1st April 2018 to May 30 2019**. Results:** A

total of 5128 neonates were admitted in our neonatology during this study period. Out of these a total of 414 neonates presenting with a wide spectrum of clinical signs and symptoms were diagnosed with neonatal septicemia. Among these 414 neonatal septicemia cases 265 neonates were inflicted with community acquired sepsis and 149 neonates developed Nosocomial sepsis. Furthermore refusal of feeds, feeding intolerance, hypothermia and Tachypnea were observed to be the predominant presenting features in neonatal septicemia. Low birth weight and preterm gestation were observed to be the leading risk factors in inflicting neonatal sepsis. Meanwhile 76 neonates among 265 community acquired sepsis cases were observed to have positive blood culture results. Furthermore 122 neonates among 149 Nosocomial sepsis cases were observed having positive blood culture results. Klebsiella was found to be the predominant organism isolated overall and also the predominant gram negative organism isolated. Enterococcus was found as the predominant gram positive organism isolated. Furthermore gram positive organisms showed 100% sensitivity to vancomycin. However among gram negative organisms an important observation was that these organisms showed significant resistance to quinolones, beta-lactam, amino glycosides and other class of antibiotics. As a result, driven by sensitivity profile of these organisms, we had to change antibiotics and upgrade to colistin sulphate and tigecycline in a large number of neonates for the better management of neonatal septicemia **Conclusions:** Clinical assessment using a combination of symptoms and signs are useful guides to provisional diagnosis of neonatal sepsis. Prevalence of sepsis is inversely related to birth weight and gestational age. High degree of culture positivity is noted in neonatal sepsis. There is increasing incidence of gram negative organisms. High degree of antibiotic resistance pattern is seen in neonatal sepsis. Time has come where a multifaceted approach needs to be put in action for reducing the incidence of community acquired and Nosocomial sepsis.

INTRODUCTION

Neonatal septicemia or sepsis neonatorum refers to systemic infection of the new born. It is a clinical syndrome of systemic illness accompanied by bacteremia occurring in the first month of life. Prompt recognition, appropriate antimicrobial therapy and judicious supportive care are the key determinants of positive outcome in this serious pediatric emergency. [1] Sepsis is the commonest cause of neonatal mortality and is probably responsible for 30% - 50% of the neonatal deaths each year in developing countries.[1,2] The reported incidence of neonatal sepsis is 38 per 1000 live births in Asia. The incidence is lower in western countries.[3] According to Neonatal Perinatal Database (NNPD) last reported data collected in 2002-2003

from 18 various parts of India, the incidence of neonatal sepsis has been reported to be 29 per 1000 live births.[4] According to WHO estimates, there were about 5 million deaths in 1995, 98% of them occurred in developing countries. The number of deaths decreased to 4 million in 2005, but among them 98% still occurred in developing countries.[5] In developing countries neonatal mortality from all the causes are about 34 per 1000 live births, most of the deaths occurring in the first week of life and most of them on the first day. In contrast in the developed world it is only five per 1000 live births.[3]

Classification of sepsis

Early onset sepsis usually presents within first 72 hours of life. In severe cases, the neonate may be symptomatic in utero (fetal tachycardia, poor beat to beat variability) or within a few hours after birth.[1] It is associated with acquisition of microorganism from the mother, transplacental infection or an ascending infection from the cervix caused by organisms that colonize in the mother's genitourinary tract.[1,2,6,7]

Late onset sepsis usually presents after 72 hours of age.[1] It is acquired from the environment. The infant's skin, respiratory tract, conjunctiva, gastrointestinal tract and umbilicus may become colonized from environment, leading to possibility of late onset sepsis from invasive microorganisms. Vectors for colonization include vascular or urinary catheter, indwelling lines or contact from care givers with bacterial colonization.[1,2,6,7] Nosocomial or hospital acquired infections include any infection that are not present or incubated at the moment of hospital admission and, thus, are acquired during hospitalization or upto 72 hours after discharge. The centers for disease control and prevention (CDC) defines a Nosocomial infection as infection arising after admission to NICU, that was not transplacentally acquired.

AIMS AND OBJECTIVES

To study the bacteriological profile of community acquired and hospital acquired neonatal sepsis and to study the sensitivity of the causative organisms to antibiotics.

The study was done over a period of one year from 1st April 2018 to 30th May 2019 in neonatology section of post graduate department of pediatrics at GB panth hospital an associated tertiary care pediatric hospital of government medical college Srinagar. This study is in continuation my previous study," the different clinical presentations of neonatal sepsis and the risk factors in babies presenting with neonatal sepsis". Our neonatology section is a exclusively out born facility where all neonates admitted are born outside.

MATERIAL AND METHODS

This study was a prospective observational study in neonatology section of Post Graduate Department of Pediatrics at GB Panth hospital, an associated tertiary care pediatric hospital of Government Medical College Srinagar, Northern India, from1st April 2018 to May 30 2019. Our neonatology section is a exclusively out born facility where all neonates admitted are born outside. The study population consisted of all neonates fulfilling the inclusion criterias and whose legal guardians/parents consented for the study with signs and symptoms suggestive of infection along with any antenatal risk factors for neonatal sepsis if any, admitted in this unit within the study period.

Patient selection

- **Inclusion criteria**

Infants < 28 days clinically suspected as a case of neonatal septicemia.

- **Exclusion criteria**
- Age more than 28 days
- Patients who had already received IV antibiotics for more than 3 days at the time of admission

Patient selection

All the neonates, with at least one of the following clinical criteria:

Clinical criteria

General: - Alteration in behavior and change in established feeding pattern is an early sign. Lethargy, refusal to feed, feed intolerance, failure to gain weight, temperature instability (Hypothermia/ Fever).

Circulatory system: - Pallor, cyanosis, cold clammy skin, bradycardia / tachycardia, poor capillary filling and hypotension.

Respiratory system: - Apnea, dyspnea, tachypnea with chest retraction, cyanosis, grunting and flaring.

Central nervous system: - Lethargy. Irritability, high pitched cry, vacant stare, hypotonia, abnormal reflexes, seizures, tremors and bulging anterior fontanel.

Gastrointestinal tract: - Vomiting, diarrhea, abdominal distension hepatomegaly and splenomegaly.

Renal system: - Oliguria.

Hematological system: - jaundice, pallor, splenomegaly, petechiae, purpura and mucosal bleeding.

Skin changes: - Multiple pustules, abscesses, sclerema, mottling, umbilical redness and discharge.

Once the patients were admitted as suspected neonatal septicemia, evaluation was done as Samples for complete blood count (CBC), total leukocyte count (TLC), absolute neutrophil count(ANC), Platelet count, C-reactive protein (CRP), urine, blood and cerebrospinal fluid (CSF) cultures were taken and sent to the laboratory. Chest x-rays were done in those who presented with respiratory symptoms.

Once samples were taken, the neonates with strong clinical suspicion of sepsis were placed on appropriate antibiotic therapy. In those with positive cultures, antibiotic therapy was re-adjusted according to sensitivity results. A positive sepsis screen was defined as two or more abnormal test results.[8,9,10,11,12,13]

Sample collection

An area of approximately 5 cm over the venipuncture site was disinfected with 70% alcohol rubbing vigorously and allowed to dry. This was followed by application of povidine Iodine in concentric circles over the site and allowed to dry for atleast 1minute. About 1 ml of the blood sample was inoculated aseptically into a blood culture bottle.

Samples for CBC, CRP, urine examination and CSF were collected from appropirite sites under all aseptic conditions.

Blood culture: 1 ml of venous blood was withdrawn under all aseptic conditions and inoculated into the available **BacT/ALERT® PF vials** and culture done by automated blood culture system known as **BacT/ALERT-3D System**

Antibiotic susceptibility testing

Antibiotic susceptibility testing was done by automated VITEK-3-compact system antibiotic sensitivity testing.

Statistical analysis

Data was analyzed as per standard statistical analysis. Data was entered in a Microsoft excel spreadsheet. Continuous variables were summarized as mean and standard deviation. Categorical variables were summarized as percentage.

OBSERVATIONS AND RESULTS

A total of 5128 neonates were admitted in our neonatology during this study period. Out of these a total of 414 neonates presenting with a wide spectrum of clinical signs and symptoms were diagnosed with neonatal septicemia. Among these 414 neonatal septicemia cases 265 neonates were inflicted with community acquired sepsis and 149 neonates developed Nosocomial sepsis (table1).

Table 1: Showing the spectrum of community Acquired and Nosocomial sepsis.

Total Neonatal admissions	5128
Neonatal septicemia cases	0414
Community acquired sepsis cases	0265
Nosocomial sepsis cases	0149

Clinical features profile

In our study the commonest presenting feature was lethargy/ refusal of feeds observed in 66.18% (274 cases) followed by hypothermia 44.20% (183), tachypnoea 40.09% (166 cases), grunting 32.12% (133 cases), delayed CRT 29.95% (128 cases), feeding intolerance 29.95% (124), prolonged jaundice 14.97% (62), Oliguria 11.83% (49), irritability 9.90% (41),seizures 9.17% (38), diarrhea 7% (29), vomiting 4.83% (20), abscesses 3.38% (14), umbilical discharge 1.93% (8) and pustulosis. 96% (4) respectively.(Table 2)

Table 2: Showing the spectrum of presenting clinical features of neonatal sepsis

Presenting feature	Number of patients	Percentage (%)
Lethargy /Refusal of feed	274	66.18
Feeding intolerance	124	29.95
Tachypnea	166	40.09
Hypothermia	183	44.20
Fever	082	19.80
Grunting	133	32.12
Delayed CRT	124	29.95
Prolonged jaundice	062	14.97
Seizures	038	09.17
Irritability	041	09.90
Diarrhea	029	07.00
Oliguria	049	11.83
Umbilical discharge	008	01.93
Abscess	014	03.38
Pustulosis	004	00.96

Risk factor profile

In our study low birth weight (wt<2.5 kg) was found as the leading risk factor in 68.35% babies of neonatal septicemia, followed by preterm gestation (37 weeks) in 40.57%, PROM>18hours in mother in 31.88%, delivery at home in 22.22 %, positive pressure ventilation in 20.29%, Perinatal asphyxia in 13.77%, maternal fever during labour in 10.62%, multiple intrapartum vaginal examinations (>3) in mother in 4.59%,Chorioamnionitis in 3.62%, central venous arterial catheterization in 3.14% and purulent foul smelling vaginal discharge in 2.89%.(Table 3.)

Table 3: Showing the spectrum of risk factors in babies presenting with neonatal sepsis.

Risk factors	No of patients	Percentage (%)
Low birth weight	283	68.35
Preterm	168	40.57
PROM>18hrs	132	31.88
Delivery at home	92	22.22
Purulent/foul smelling vaginal discharge	12	02.89
Chorioamnionitis	15	03.62
Maternal fever during labour	44	10.62
Multiple intrapartum PV examinations	19	04.59
Perinatal asphyxia	57	13.77
Positive pressure ventilation	84	20.29
Central venous/arterial catherization	13	03.14

Blood culture positivity Profile

In our study out of 414 cases of neonatal sepsis, 47.82 %(198) were culture positive. Among the culture positive cases majority were gram negative, 80.30% (159 cases) followed by gram positive 15.15% (30cases) and fungi, 4.54% (9 cases). (Table 4)

Table 4: Showing blood culture positivity profile of neonatal sepsis.

Blood culture	Number of patients	Percentage (%)
Culture positive	198	47.82
Culture negative(sterile)	216	52.17

Blood culture positivity profile of community acquired neonatal sepsis

In our study out of total of 414 cases of neonatal sepsis there were a total of 265 cases of community acquired sepsis, 189 cases among these had sterile blood cultures and 76 cases had positive blood cultures. (Table 5)

Table 5: Showing blood culture positivity profile of neonatal sepsis.

Blood culture	Number of patients	Percentage (%)
Culture positive	076	28.67
Culture negative(sterile)	189	71.32

Blood culture positivity profile of nosocomial neonatal sepsis

In our study out of a total of 414 cases of neonatal sepsis there were 149 case of Nosocomial sepsis, out of which 122 cases had blood culture positive neonatal sepsis and 27 cases had sterile blood cultures. (Table 6)

Table 6: Showing blood culture positivity profile of nosocomial neonatal sepsis.

Blood culture	Number of patients	Percentage (%)
Culture positive	122	81.88
Culture negative(sterile)	027	18.12

Blood culture profile

In our study among the 47.82% (198) culture positive cases majority were gram negative 80.30% (159 cases) followed by gram positive 15.15% (30 cases) and fungi 4.54% (9 cases). (Table 7)

Table 7: Showing blood culture profile of neonatal septicemia.

Blood culture profile	Number of patients	Percentage (%)
Gram positive	030	15.15
Gram negative	159	80.30
Fungi	009	04.54

Blood culture profile of community acquired sepsis

In our study among the 265 community acquired neonatal sepsis cases, 76 neonates had positive blood culture results. Among the blood culture positive cases 75% (57) cases were gram negative and 13.15% (10) cases had growth of gram positive organisms on blood cultures. . (Table 8)

Table 8: Showing blood culture profile of community acquired neonatal septicemia.

Blood culture profile	Number of patients	Percentage (%)
Gram positive	10	13.15
Gram negative	57	75.00
Fungi	09	11.85

Blood culture profile of nosocomial sepsis

In our study among the 149 Nosocomial neonatal sepsis cases, 122 neonates had positive blood culture results. Among the blood culture positive cases 83.60% (102) cases were gram negative and 16.40% (20) cases had growth of gram positive organisms on blood cultures. . (Table 9)

Table 9: Showing blood culture profile of nosocomial neonatal septicemia.

Micro organism	Number of patients	Percentage (%)
Gram negative	102	83.60
Gram positive	20	16.40

Gram negative profile

In our study among the 159 gram negative organisms isolated, Klebsiella was most commonly isolated in 60.37%(96 cases) followed by E. Coli 11.94% (19 cases), pseudomonas 10.69% (17 cases) acinetobacter 10.69% (17 cases), enterobacter 4.40% (7 cases) and proteus 1.88% (3 cases). (Table 10)

Table 10: Showing the isolated gram negative organism profile of neonatal sepsis.

S no	Organism	No of patients	Percentage among culture proven sepsis (%)	Percentage among gram – ve organisms (%)
1	Klebsiella	96	48.48	60.37
2	Enterobacter	07	03.53	04.40
3	E.coli	19	09.59	11.94
4	Pseudomonas	17	08.58	10.69
5	Proteus	03	01.51	01.88
6	Acinetobacter	17	08.58	10.69

Gram positive profile

In our study among the gram positive organisms, commonest isolate was Enterococcus 43.33% (13 cases) followed by coagulase positive staphylococci 30% (9 cases) and coagulase negative Staphylococci 26.6 % (8 cases). (Table 11)

Table 11: Showing the profile of isolated gram positive organisms in neonatal sepsis.

S no	Gram positive profile	No of patients	Percentage among culture proven sepsis (%)	Percentage among gram +ve organisms (%)
1	Enterococcus	13	06.56	43.33
2	Coagulase positive	09	04.54	30.00

	staph aureus			
3	Coagulase negative staph aureus	08	04.04	26.66

Organism profile of community acquired neonatal sepsis

Out of 5128 neonatal admissions, 414cases were having neonatal sepsis, out of which 265 neonates had Nosocomial sepsis. Out of these, 76 neonates had culture positive neonatal sepsis, 57 cases reporting gram negative sepsis, 10 cases gram positive and 09 cases of fungal neonatal septicemia. (Table 12)

Table 12: Showing the distribution of gram negative and gram positive organisms in community acquired neonatal sepsis.

Gram negative organisms			Gram positive organisms		
Organism	**No**	**Percentage (%)**	**Organism**	**No**	**Percentage (%)**
Klebsiella	26	34.21	Coagulase –ve staph. Aureus	06	7.89
E.coli	19	25.00	Coagulase +ve staph. Aureus	04	5.26
Proteus	03	03.94			
Pseudomonas	09	11.84			

Organism profile of nosocomial neonatal sepsis

Out of 5128 neonatal admissions, 414 cases were having neonatal sepsis, out of which 149 had Nosocomial sepsis, 122 documenting culture proven sepsis. Out of these 102 cases had gram negative organisms isolated and 20 had gram positive organisms. (Table 13)

Table 13: Showing the distribution of gram Negative and Gram positive organisms in Nosocomial neonatal sepsis.

Gram negative organisms			Gram positive organisms		
Organism	**No**	**Percentage (%)**	**Organism**	**No**	**Percentage (%)**
Klebsiella	70	57.37	Enterococcus	13	10.65
Acinetobacter	17	13.93	Coagulase –ve staph. Aureus	03	02.45
Pseudomonas	08	06.55	Coagulase +ve staph. Aureus	04	03.27
Enterobacter	07	05.73			

Antibiotic sensitivity pattern

Sensitivity pattern of gram positive organisms

In our study all of the gram positive organisms were sensitive to vancomycin (100%) followed by most of the organisms sensitive to amikacin (73.3%), imipenem (73.3%), Linezolid (56.6%), Ciprofloxacin (43.3%) and cefaperazone+Salbactum (30%). (Table 14)

Table 14: Showing the antibiotic sensitivity pattern of gram positive organisms.

Antibiotic	No. of patients sensitive	Percentage (%)
Ampicillin	00	00.00
Gentamicin	04	13.33
Amikacin	22	73.30
Ceftriaxone	08	26.60
Cefaperazone+Sulbactum	09	30.00
Ceftazidime	05	16.60
Piperacillin+ Tazobactum	07	23.30
Vancomycin	30	100
Imipenem	22	73.30
Ciprofloxacin	13	43.30
Linezolid	17	56.60
Clindamycin	10	33.33
Trimethoprim-sulfamethoxazole	04	13.33

Sensitivity pattern of gram negative organisms

In our study almost all of the gram negative organisms were sensitive to tigecycline (100%) and colistin (98.74%) followed in decreasing order by imipenem (88.05%), cefaperazone-salbactam (71.69%), and ceftazidime (49.05%). (Table 15)

Table 15: Showing the antibiotic sensitivity pattern of gram negative organisms.

Antibiotic	Number of patients	Percentage (%)
Ampicillin	008	05.03
Gentamicin	020	12.57
Amikacin	074	46.54
Ceftriaxone	067	42.13
Cefaperazone+Sulbactum	114	71.69
Ceftazidime	078	49.05
Piperacillin+ Tazobactum	087	54.71
Imipenem	140	88.05
Ciprofloxacin	058	36.47
Linezolid	068	42.76
Clindamycin	027	16.90
Trimethoprim-sulfamethoxazole	037	23.20
Colistin	157	98.74
Tigecycline	159	100

C Reactive protein positivity in neonatal sepsis

In our study out of 414 patients of neonatal septicemia, C reactive protein was positive in 262 cases. It was observed that in culture positive cases, C reactive protein was positive in 81.82%(164) cases while in culture negative sepsis 45.38% (98) cases had a positive C reactive protein result. (Table 16)

Table 16: Showing spectrum of CRP Positivity in culture Positive and Culture negative sepsis.

Blood culture	CRP Positive	CRP negative	Total
Culture Positive	164(82.82%)	34(17.18%)	198
Culture Negative	98(45.38%)	118(54.62%)	216

DISCUSSION

Neonatal sepsis with its high mortality rate still remains a diagnostic and treatment challenge for neonatal health care providers, developing countries having the highest incidence and mortality rates. Early diagnosis of neonatal septicemia helps the clinician in instituting antibiotics therapy at the earliest thereby reducing mortality in neonates. Early identification of an infected neonate also helps in avoiding unnecessary treatment of a non infected neonate.

The study was conducted in the Neonatology Unit of Postgraduate Department of Pediatrics, in G B Pant hospital, an associated hospital of Government Medical College Srinagar. It was a hospital based prospective observational study conducted from 1st April 2018 to 31st March 2019.

All neonates admitted in Neonatology Unit fulfilling the inclusion criteria of the study from 1/4/2018 to 31/3/2019 were prospectively studied observed and recorded.

In the present study an attempt has been made to identify the bacteriological profile of neonatal sepsis and to study the sensitivity pattern of these microorganisms, which will help in diagnosing and instituting antibiotics therapy at the earliest there by reducing mortality in neonates.

Clinical presentation

In our study the commonest presenting feature was lethargy/ refusal of feeds, which was observed in 66.18% (274) cases, followed by hypothermia in 44.20% (183) cases, tachypnoea

40.09 %(166) cases, grunting 32.12%(133) cases, delayed CRT 29.95% (128), prolonged jaundice 14.97% (62),Oliguria 11.83% (49), feeding intolerance 10.14% (42), irritability 9.90% (41), seizures 9.17% (38), diarrhea 7% (29), vomiting 4.83% (20), abscesses 3.38% (14), umbilical discharge 1.93% (8) and pustulosis 0.96% (4) respectively with low birth weight (wt<2.5kg) was found as the leading risk factor in 68.35% babies of neonatal septicemia, followed by preterm gestation (<37 weeks) in 40.57%, PROM>18 hours in mother in 31.88%, delivery at home in 22.22%,positive pressure ventilation in 20.29%, Perinatal asphyxia in 13.77%, maternal fever during labour in 10.62%, chorioamnionitis in 3.62%, central venous /arterial catheterization in 3.14%, purulent foul smelling vaginal discharge in 2.89% and multiple intrapartum vaginal examinations in mother (>3) in 4.59%.

Culture profile

In our study out of 414 cases of neonatal sepsis, 47.82 %(198) cases were culture positive. Culture positivity was similar to the studies conducted by R.Nandana Reddy Jonnala et al.[8] Saritha kamath et al[12] Zakariya B P et al.[11] In the study done by R.Nandana Reddy Jonnala et al[8] 57.10% were culture positive. The study done by Saritha kamath et al[12] had 63.4% culture positive cases. The study done by Y R Khinchi et al[16] had 52.3% culture positive ,the one conducted by Murthy DS & Gyaneshwari[17] had 52.6% culture positive cases, Aftab R & Iqbal I R[18] had 54%, Zakariya B P et al[11] 41.6%, Agnihotri N et al[14] 64.4% and Demissie shitaye et al[19] 44.7% culture positive cases.

In our study among the culture positive cases majority were gram negative 80.30% (159) cases followed by gram positive 15.15% (30) and fungi 4.54% (9).The results were comparable to the studies reported by R.Nandana Reddy Jonnala et al,[8] Steering D C et al,[9] Vishwanathan R et al,[10] Saritha kamath et al,[12] A S M Nawhad et al,[15] Demissie shitaye et al,[19] Atul Garg et al,[13] These studies showed that in culture positive sepsis predominant organisms were gram negative. The isolation rate of bacteria in our study is comparable to the rates reported by R.Nandana Reddy Jonnala et al[8] who observed gram negative-61%,gram positive 16.66% and fungi-6.2%, Steering D C et al[9] who reported gram negative-61%, gram positive-39%, Vishwanathan R et al[10] (gram positive-27.45%,gram negative-71.6%), A S M Nawhad et al[15] (gram negative73%, gram positive 27%),Demissie shitaye et al[19] (gram negative 56.3%,gram positive 43.7%), Manucha et al[21] (gram negative 76%, gram positive 24%),Simiyu et al[22] (gram negative 72% ,gram positive 26%),Saritha kamath et al[12] (gram negative 71.8%, gram positive 21.4%), Atul Garg et al[13] (gram negative 67.55,gram positive

30%), Aftab R & Iqbal I R[18] (gram positive 36%, gram negative 64%) and Milledge et al[20] (gram negative 71%,gram positive 27%).

Among the gram negative organisms, Klebsiella was the most commonly isolated organism in 60.37% (96) cases followed by E.Coli 11.94% (19) cases, pseudomonas 10.69% (17) cases, acinetobacter 10.69% (17) cases, enterobacter 4.40% (7) cases and proteus 1.88% (3)cases. Among the gram positive organisms, commonest isolate was Enterococcus 43.33% (13) cases followed by coagulase positive staphylococci 30% (9) cases and coagulase negative staphylococci 26.6% (8) cases. Meanwhile 9 cases of fungal sepsis showed growth of Candida spp. Our results were comparable with the studies conducted by Saritha kamath et al,[12] R.Nandana Reddy Jonnala et al,[8] Zakariya B P et al,[11] Afroza et al,[23] Demissie shitaye et al,[24] in the study conducted by Saritha kamath et al,[12] among the blood culture positive neonatal sepsis cases, 158 (71.8%) were gram negative and 47 (21.4%) were gram positive. Meanwhile among the gram negative organisms Klebsiella was predominant in 16.4% followed by pseudomonas (13.6%), E.Coli (11.8%), Enterobacter (11.4%), acinetobacter (10%), citrobacter (5.9%) and others (2.7%). Among the gram positive organisms, the major pathogens were staphylococcus aureus (12.35%), coagulase negative staphylococci (5.5%), Enterococcus (2.7%) and streptococcus (0.9%). Among fungi Candida albicans (6.8%) was the major pathogen. In our study in general most common isolate was Klebsiella seen in 60.41% (96cases).Our results were comparable with the studies done by R.Nandana Reddy Jonnala et al[8] (60.41%), Zakariya B P et al[11] (66%).

Antibiotic sensitivity

In our study most of the gram positive organism were sensitive to vancomycin (100%) followed by amikacin (73.3%), imipenem (73.3%), Linezolid (56.6%), Ciprofloxacin (43.3%) and cefaperazone+Salbactum (30%). However almost all of the gram negative organisms were sensitive to tigecycline (100%) and colistin (98.74%) followed in decreasing order by imipenem (82.38%) vancomycin (75.47%), cefaperazone-salbactam (71.69%), and ceftazidime (49.05%). Candida species isolated on culture was sensitive to amphotericin-B (100%) and fluconazole (91%). However it was observed that in the present scenario gram negative organisms were showing a lot of resistance to previously sensitive antibiotics. This observation is comparable to that of other researchers R.Nandana Reddy Jonnala et al.[8]

However it's a matter of concern that organisms like acinetobacter and Klebsiella are now showing increasing resistance to even broad spectrum beta-lactam antibiotics. This could be

attributed to irrational antibiotic use, lacunae in following the CDC (centre for disease control) guidelines for prevention of sepsis, overcrowding in the neonatal nursery, poorly equipped antenatal and obstetric health care in peripheral areas.

CONCLUSION

Clinical assessment using a combination of symptoms and signs are useful guides to provisional diagnosis of neonatal sepsis. Prevalence of sepsis is inversely related to birth weight and gestational age. High degree of culture positivity is noted in neonatal sepsis. There is increasing incidence of gram negative organisms. High degree of antibiotic resistance pattern is seen in neonatal sepsis. Time has come where a multifaceted approach needs to be put in action for reducing the incidence of community acquired and Nosocomial sepsis.

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