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Original Research Article

Incidence of culture proven neonatal sepsis, pattern of antibiotic sensitivity and clinical course in neonatal intensive care unit in tertiary care center in North India

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ABSTRACT

Background: Neonatal sepsis is a major cause of neonatal mortality, accounts for nearly half of all the neonatal deaths in our country. The incidence of neonatal septicemia ranges from 1 to 10 per 1000 live births. In our country the incidence of culture proven neonatal sepsis is 8.6 per 1000 live births, intramural data. Antibiotics are rapidly losing their effectiveness, with some early reports going so far to suggest that we are approaching a post-antibiotic era. Aims of this study was to find out the incidence of culture proven neonatal sepsis and to analyze data collected for mortality and morbidity in culture proven neonatal sepsis and antibiotic sensitivity pattern in culture proven neonatal sepsis at Neonatal Intensive Care Unit of Santokba Durlabhji Memorial Hospital (SDMH), Jaipur.
Methods: The study included 129 newborn fulfilling the inclusion criteria, admitted into NICU of SDMH, Jaipur from 01st January 2013 to 31st December 2013, were investigated using various hematological and biochemical test e.g. CBC, Serum CRP, Blood culture and sensitivity, CSF examination includes cell counts, gram staining, biochemistry, culture and sensitivity etc.
Results: Overall 722 cases admitted in NICU during the period of one-year 2013. Out of which 129 cases had blood culture proven neonatal sepsis (17.87%). 14.88% cases in P.C.U. and 21.79% cases in I.P.U. had positive blood culture sepsis with statistically significant difference (p value 0.016, <0.05).
Conclusions: Antibiotic resistance is an emerging problem requires justified use of antibiotics.

Keywords: Antibiotic resistance, Blood culture and sensitivity, Mortality, Sepsis

INTRODUCTION

Infections are an important cause of neonatal morbidity and mortality worldwide. Neonatal infections among low-birth-weight infants are associated with significant risk of neurologic abnormalities, developmental and functional delays.[1]

Although most neonatal infections are of maternal or community origin, an increasing proportion are acquired in the nursery. Advances in newborn intensive care have permitted the survival of low-birthweight and sick infants and simultaneously have created risks for neonatal infections, which are themselves a significant cause of mortality in these infants.[2] Reported infection rates in the

neonatal intensive care unit (NICU) vary from 3.2 to 30 per 100 admissions, illustrating the wide variability among centers. NICUs that admit surgery patients may have higher rates.[3] Nosocomial blood stream infections (BSIs) are increasing in prevalence and resulting in significant morbidity, mortality and economic cost. From 1975 to 1996, the proportion of nosocomial infections accounted for BSIs increased from 5% to 14%.[4] Neonatal sepsis is a major cause of neonatal morbidity and mortality and accounts for nearly half of all the neonatal deaths in our country.[5] The incidence of neonatal septicemia ranges from 1 to 10 per 1000 live births. In our country the incidence of culture proven neonatal sepsis is 8.6 per 1000 live births, intramural data.[6] High morbidity and mortality resulting from neonatal septicemia is due to deficient host defense mechanisms in newborn, particularly when preterm; lack of specific and sensitive tests to diagnose sepsis early and little use of host defense modulating therapies in neonatal septicemia.[7] Early manifestations of infection are often subtle and nonspecific such as inability to tolerate feed, irritability or lethargy. Many organs and tissues alone or in combination may become infected from hematogenous spread.[8]

Common manifestations of septicemia in newborns are temperature imbalance with transient hyperthermia or hypothermia, respiratory distress in the form of mild tachypnea, retraction, grunting cyanosis, slight increase in oxygen requirement, apnea, poor feeding, oliguria, edema, jaundice, pallor, bleeding, purpura, petechiae, etc. Gastrointestinal manifestations include vomiting, diarrhea, abdominal distension, ileus and hepatomegaly. CNS symptoms include irritability, lethargy, seizures, dullness, high pitched cry, bulging fontanelle, abnormal Moro's reflex, hyporeflexia, hypertonia or hypotonia. CVS manifestations may be tachycardia, bradycardia, hypotension, shock.

Hypothermia is more common in infected preterm while fever is seen more in full term newborns.[9]No single laboratory test has been found to possess acceptable specificity and sensitivity for predicting neonatal infection. Therefore, the results of laboratory studies must be assessed in conjunction with the presence of risk factors and clinical signs of sepsis. Identification of a bacterial infection may be made by isolating etiological agent from a body fluid that is usually sterile (blood, CSF, joint fluid, urine).[9]

In recent years, the subject of the emergence and subsequent increase in the incidence of resistance to antimicrobial agents has become a serious threat. Reports from all around the world suggest that antibiotics are rapidly losing their effectiveness, with some early reports going so far to suggest that we are approaching a post-antibiotic era.[10] Aim and objectives were to find the incidence of neonatal sepsis in NICU admissions in our hospital. Antibiotic sensitivity pattern in our NICU. Clinical course of neonatal sepsis during hospital stay.

METHODS

The present study was planned to find out the incidence of culture proven neonatal sepsis and to analyze data collected for mortality and morbidity in culture proven neonatal sepsis and antibiotic sensitivity pattern in culture proven neonatal sepsis at SDMH, Jaipur. Study design was cross-sectional type of observational study. Study place was Neonatal intensive care unit (NICU) of Santokba Durlabhji Memorial Hospital cum Medical Research Institute (SDMH) Jaipur, Rajasthan is a 20 bedded level III unit well equipped to handle complications in a newborn. Study period was 01st January 2013 to 31st December 2013 Study Population was 129 newborns fulfilling the inclusion criteria, admitted into Neonatal Intensive Care Unit of SDMH, Jaipur were included in the study.

Inclusion criteria

- All babies born inside/outside our hospital and admitted in NICU at SDMH, Jaipur with Neonates who had clinical features suggestive of neonatal septicemias such as refusal to feed, dullness, fever, seizure, respiratory distress, excessive irritability, vomiting, abdominal distension , jaundice , bleeding or shock were included in the study.

Exclusion criteria

- All newborns with negative blood culture profile.
- Newborns with major congenital malformations.

A detailed antenatal history was taken from the attendant by interview method for any risk factor such as prolonged rupture of membranes, APH, maternal intrapartum fever, birth asphyxia, foul smelling liquor, prematurity, low birth weight etc. and a thorough physical examination was conducted at the time of admission.

A proper parental consent was taken prior to enrolling the newborn in the study group. Gestational age assessment was done by maternal menstrual history, prenatal ultrasonography and postnatal maturational examination.

After detailed antenatal history and complete physical examination all these newborns included in the study were investigated using various hematological and biochemical tests. CBC, Serum CRP, Blood culture and sensitivity, CSF examination includes cell counts, gram staining, biochemistry, culture and sensitivity and other investigation like chest X- ray, gastric aspirate, metabolic profile (Serum Ca, Mg, blood sugar levels) etc were done.

Data analysis

Data analysis was done with the help of distribution of cases on the basis of age, sex, clinical presentation, blood

reports and Biochemical reports. The statistical test used was Chi square test (p value).

RESULTS

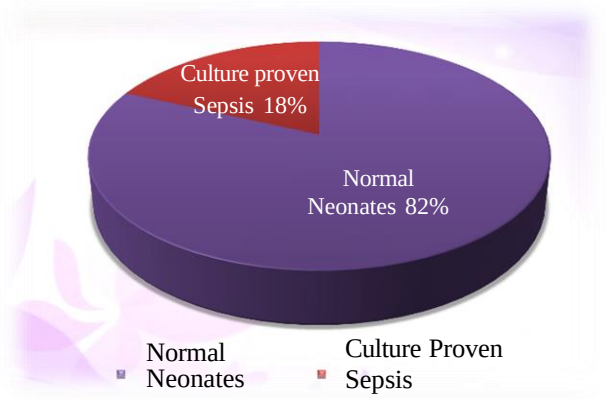

Figure 1: Neonatal sepsis 2013.

Figure 1 shows:

- 722 neonates admitted in N.I.C.U. in the year 2013
- 129 (18%) neonates had blood culture proven sepsis
- 88 (P.C.U. 34, I.P.U. 54) were males
- 41 (P.C.U. 27, I.P.U. 14) were females

Table 1: Distribution of blood culture confirmed cases among IPU/PCU discussion.

	P.C.U.	I.P.U.
Distribution	**No. of infants (N=410)**	**No. of infant (N=312)**
Culture positive sepsis	61	68
Culture negative sepsis	349	244

Table 2: Culture and Sensitivity pattern in I.P.U.(n=68) Year 2013.

	Klebsiella pneumoniae	*Staphylococcus spp.*	*Acinetobacter*	*Enterobacter cloacae*	*Candida spp.*	Others	Total
	9/68 (13.23%)	16/68(23.53%)	4/68(5.89%)	4/68(5.89%)	25/68 (36.76%)	10/68 (14.70%)	n=68
Amikacin	2/9(22.22%)		0/4(00.00%)	1/4(25.00%)		2/4(50.00%)	5/21(23.80%)
Amphotericin B					23/25(92.00%)		23/25(92.0%)
Ampicillin						0/1(00.00%)	0/1(00.00%)
Ampicillin sulbactum	1/3(33.33%)		0/2(00.00%)	0/1(00.00%)		1/1(100%)	2/7(28.57%)
Azithromycin	0/6(00.00%)		0/2(00.00%)	0/3(00.00%)		0/3(00.00%)	0/14(00.00%)
Cefepime	4/9(44.44%)		0/4(00.0%)	1/4(25.00%)		3/4(75.00%)	8/21(38.09%)
Ceftriaxone	0/3(00.00%)		0/2(00.00%)	0/1(00.00%)		1/1(100%)	1/7(14.28%)
Ciprofloxacin		1/4(25.00%)	0/4(00.00%)	2/3(66.67%)		3/6(50.00%)	6/17(35.29%)
Clindamycin		4/6(66.67%)					4/6(66.67%)
Erythromycin		0/4(00.00%)				0/2(00.00%)	0/6(00.00%)
Fluconazole					21/25 (84.00%)		21/25(84.0%)
Gentamicin	1/9(11.11%)	4/4(100%)	1/4(25.00%)	0/4(00.00%)		2/4(50.00%)	8/25(32.00%)
Imepenem	3/9(33.33%)		0/4(00.00%)	1/4(25.00%)		3/4(75.00%)	7/21(33.33%)
Levofloxacin	7/9(77.78%)	1/4(25.00%)	0/4(00.00%)	2/4(50.00%)		3/6(50.00%)	13/27(48.15%)
Linezolid		5/6(83.33%)				1/2(50.00%)	6/8(75.00%)
Meropenem	4/9(44.44%)		0/4(00.00%)	1/4(25.00%)		4/4(100%)	9/21(42.86%)
Moxifloxacin		3/4(75.00%)					3/4(75.00%)
Nitrofurantoin		4/6(66.67%)				0/2(00.00%)	4/8(50.00%)
Oxacillin		3/5(60.00%)					3/5(60.00%)
Piperacillin tazobactum	1/9(11.11%)		0/3(00.00%)	0/4(00.00%)		2/4(50.00%)	3/20(15.00%)
Quinapristone dalfrastone		2/2(100%)				1/1(100%)	3/3(100%)
Tetracycline	3/3(100%)	4/4(100%)	0/2(00.00%)	0/1(00.00%)		1/3(66.67%)	8/13(61.54%)
Tigecycline	9/9(100%)	5/6(83.33%)	3/4(75.00%)	4/4(100%)		5/6(83.33%)	26/29(89.65%)
Tobramycin	1/3(33.33%)		1/2(50.00%)			1/1(100%)	3/6(50.00%)
Vancomycin		5/6(83.33%)				1/2(50.00%)	6/8(75.00%)
Voriconazole					25/25(100%)		25/25(100%)

Table 3: Culture and sensitivity pattern in P.C.U. (n=61) year 2013.

	Klebsiella pneumonia	*Staphylococcus spp.*	*Acinetobacter*	*Pseudomonas*	*Candida spp.*	Others	Total
	8/61(13.11%)	12/61 (19.67%)	5/61(8.20%)	2/61(3.28%)	26/61(42.62%)	8/61 (13.11%)	n=61
Amikacin	0/8(00.00%)		0/5(00.00%)	1/2(50.00%)		3/3(100%)	4/18 (22.22%)
Amphotericin B					19/22(86.3%)		19/22 (86.36%)
Ampicillin sulbactum	0/2(00.00%)		0/3(00.0%)	0/1(00.00%)		0/2(00.00%)	0/8(00.0%)
Azithromycin	0/6(00.00%)		0/2(00.00%)	0/1(00.00%)		3/3(100%)	3/12(25.0%)
Cefazolin						0/2(00.00%)	0/2(00.0%)
Cefepime	1/8(12.50%)		0/5(00.00%)	2/2(100%)		3/3(100%)	6/18 (33.33%)
Ceftriaxone	0/2(00.00%)		0/3(00.00%)	0/1(00.00%)		2/2(100%)	2/8(25.0%)
Ciprofloxacin	8/8(100%)	0/9(00.00%)	0/5(00.00%)	2/2(100%)		2/4(50.00%)	12/28 (42.86%)
Clindamycin		2/9(22.22%)					2/9(22.22%)
Etrapenem						2/2(100%)	2/2(100%)
Erythromycin		2/9(22.22%)				0/1(00.00%)	2/10(20.0%)
Fluconazole					18/22(81.82%)		18/22 (81.82%)
Gentamicin	0/8(00.00%)	2/9(22.22%)	0/5(00.00%)	0/2(00.00%)		3/3(100%)	5/27 (18.52%)
Imepenem	0/8(00.00%)		0/5(00.00%)	2/2(100%)		2/3(66.67%)	4/18 (22.22%)
Levofloxacin	7/8(87.50%)	0/9(00.00%)	0/5(00.00%)	2/2(100%)		0/2(00.00%)	9/26 (34.61%)
Linezolid		7/9(77.78%)				1/1(100%)	8/10(80.0%)
Meropenem	1/8(12.50%)		0/5(00.00%)	2/2(100%)		3/3(100%)	6/18 (33.33%)
Moxifloxacin		1/5(20.00%)				2/2(100%)	3/7(42.86%)
Nitrofurantoin		9/9(100%)				0/3(00.00%)	9/12(75.0%)
Oxacillin		0/9(00.00%)					0/9(00.0%)
Piperacillin tazobactum	0/8(00.00%)		0/3(00.00%)	2/2(100%)		3/3(100%)	5/16 (31.25%)
Tetracycline	1/2(50.00%)	9/9(100%)	2/3(66.67%)	0/2(00.00%)		1/1(100%)	13/17 (76.47%)
Tigecycline	7/8(87.50%)	9/9(100%)	5/5(100%)	0/2(00.00%)		4/4(100%)	25/28 (89.28%)
Tobramycin	0/2(00.00%)		1/3(33.33%)	2/2(100%)		2/2(100%)	5/9(55.56%)
Vancomycin		6/8(75.00%)				0/1(00.00%)	6/9(66.67%)
Voriconazole					22/22(100%)		22/22 (100%)

Table 1 shows:

- The chi square statistics is 5.7762
- p value is 0.016244
- This result is significant at p<0.05

Table 3 shows that among total 61 culture proven cases in P.C.U, *Candida spp.* (26 cases) > *Staphylococcus spp.* (12 cases) > *Klebsiella spp.* (8 cases) are more common. Candida spp. shows maximum sensitive to voriconazole (100%) >amphotericin B (86.36 %) while *Staphylococcus spp.* shows maximum sensitivity to tigecycline (100%), tetracycline (100%), nitrofurantoin (100%) >linezolid (77.78%). *Klebsiella spp.* shows maximum sensitivity to ciprofloxacin (100%) >levofloxacin (87.50%) >tigecycline (87.50%).

Table 4 shows that among total 61 culture proven cases in P.C.U, *Candida spp*. (26 cases, 42.62%) >*Staphylococcus spp.* (12 cases, 19.67%) >*Klebsiella spp.* (8 cases, 13.11%) are more common. Among total 68 culture proven cases in I.P.U, *Candida spp.* (25 cases, 36.76%) >*Staphylococcus spp.* (16 cases, 23.53%) >*klebsiella spp.* (9 cases, 13.23%) are more common. Table 5 shows that overall sensitivity pattern in P.C.U. shows maximum sensitivity to voriconazole (100%) > amphotericin B (86.36%) >fluconazole (81.82%) for fungal infection

while bacterial infection shows maximum sensitivity to tigecycline (89.28%) >linezolid (80%) >tetracycline (76.47%). Table 6 shows that overall sensitivity pattern in I.P.U. shows maximum sensitivity to voriconazole (100%) >amphotericin B (92%) >fluconazole (84%) for fungal infection while bacterial infection shows maximum sensitivity to tigecycline (89.65%) >linezolid (75%) >vancomycin (75.00%).

Table 4: Distribution of blood culture isolates from I.P.U. and P.C.U.

	P.C.U.	I.P.U.	
Organisms	**No. of isolates(n=61)**	**No. of isolates(n=68)**	**p value**
Klebsiella pneumoniae	8/61(13.11%)	9/68(13.23%)	0.984
Staphylococcus spp.	12/61(19.67%)	16/68(23.53%)	0.596
Acinetobacter	5/61(8.20%)	4/68(5.89%)	0.606
Pseudomonas	2/61(3.28%)	0/0(00.00%)	0.132
Enterobacter cloacae	0/0(00.00%)	4/68(5.89%)	0.054
Candida spp.	26/61(42.62%)	25/68(36.76%)	0.497
Others	8/61(13.11%)	10/68(14.70%)	0.795
Total	n=61	n=68	

Table 5: Overall antibiotic sensitivity pattern of pathogens in P.C.U.

Antibiotics	Total (n=61)
Amikacin	4/18(22.22%)
Amphotericin B	19/22(86.36%)
Ampicillin sulbactam	0/8(00.00%)
Azithromycin	3/12(25.00%)
Cefazolin	0/2(00.00%)
Cefepime	6/18(33.33%)
Ceftriaxone	2/8(25.00%)
Ciprofloxacin	12/28(42.86%)
Clindamycin	2/9(22.22%)
Etrapenem	2/2(100%)
Erythromycin	2/10(20.00%)
Fluconazole	18/22(81.82%)
Gentamicin	5/27(18.52%)
Imepenem	4/18(22.22%)
Levofloxacin	9/26(34.61%)
Linezolid	8/10(80.00%)
Meropenem	6/18(33.33%)
Moxifloxacin	3/7(42.86%)
Nitrofurantoin	9/12(75.00%)
Oxacillin	0/9(00.00%)
Piperacillin tazobactum	5/16(31.25%)
Tetracycline	13/17(76.47%)
Tigecycline	25/28(89.28%)
Tobramycin	5/9(55.56%)
Vancomycin	6/9(66.67%)
Voriconazole	22/22(100%)

Table 6 shows that antibiotics and intravenous fluid given to majority of neonates (66/68, 97.05%, both). Oxygen was used in 75% cases (51/68) and phototherapy was given to 48.52% cases (33/68) in I.P.U. while in P.C.U. antibiotics were used in 100% cases (61/61), intravenous fluid was given in 96.72% cases (59/61), Oxygen was used in 90.16% cases (55/61) and phototherapy was given to 73.77% cases (45/61).

Table 6: Overall antibiotic sensitivity pattern of pathogens in I.P.U.

Antibiotic	Total (n=68)
Amikacin	5/21(23.80%)
Amphotericin B	23/25(92.00%)
Ampicillin	0/1(00.00%)
Ampicillin sulbactam	2/7(28.57%)
Azithromycin	0/14(00.00%)
Cefepime	8/21(38.09%)
Ceftriaxone	1/7(14.28%)
Ciprofloxacin	6/17(35.29%)
Clindamycin	4/6(66.67%)
Erythromycin	0/6(00.00%)
Fluconazole	21/25(84.00%)
Gentamicin	8/25(32.00%)
Imipenem	7/21(33.33%)
Levofloxacin	13/27(48.15%)
Linezolid	6/8(75.00%)
Meropenem	9/21(42.86%)
Moxifloxacin	3/4(75.00%)
Nitrofurantoin	4/8(50.00%)
Oxacillin	3/5(60.00%)
Piperacillin tazobactam	3/20(15.00%)
Tetracycline	8/13(61.54%)
Tigecycline	26/29(89.65%)
Tobramycin	3/6(50.00%)
Vancomycin	6/8(75.00%)
Voriconazole	25/25(100%)

Table 7: Indicators of conditions of care.

	P.C.U.		I.P.U.		
Therapy given	**Number of infants (n=61)**	**%**	**Number of infants (n=68)**	**%**	**p value**
I/V Fluids	59	96.72	66	97.05	0.942
Antibiotics	61	100	66	97.05	0.177
Oxygen	55	90.16	51	75	0.0247
Phototherapy	45	73.77	33	48.52	0.0034
Assisted ventilation	19	31.14	23	33.82	0.746
Blood/plasma transfusion	20	32.78	25	36.76	0.636

Table 8: Indicators of conditions of care.

	P.C.U.		I.P.U.		
Outcome	**Number of infants (n=61)**	**%**	**Number of infants (n=68)**	**%**	**p value**
Recovered	38	62.29	45	66.17	0.646
Discharged on request	7	11.47	8	11.76	0.959
Left against medical advice	10	16.39	10	14.70	0.791
Expired	6	9.83	4	5.88	0.402
Referred	0	0.00	1	1.47	0.342

Table 7 shows that in P.C.U., out of 61 cases of blood culture proven neonatal sepsis-38 cases (62.29%) were recovered and discharged in stable condition. 7 cases (11.47%) discharged on request. 10 cases left against medical advice (16.39%) and 6 cases expired (9.83%). In I.P.U., out of 68 cases of blood culture proven neonatal sepsis-45 cases (66.17%) were recovered and discharged in stable condition. 8 cases (11.46%) discharged on request. 10 cases left against medical advice (14.70%) and 4 cases expired (5.88%).

DISCUSSION

The aim of this research was to study the incidence of blood culture proven neonatal septicemia at Santokba Durlabhji Hospital Jaipur in the year 2013. Antimicrobial susceptibility of the isolated microorganisms from different sources was tested to evaluate the role of antibiotic prophylaxis and treatment in the dynamics of the problem.

There are several reasons why neonatal septicemia has to be set apart from those at other ages. First, the early signs are vague and nonspecific and, if not actually overlooked altogether, are rarely accorded significance so that the diagnosis is too often made late. Secondly, host defense is naturally not at an advanced stage of competence early in life, especially in preterm whose blood brain barrier is fragile and more permeable. Finally the infecting organisms are many and predominantly gram negative. This cross-sectional type of observational study conducted on newborns admitted in the neonatal intensive care unit at Santokba Durlabhji Memorial Hospital cum Medical Research Institute, Jaipur, over a period of one year from January 2013 to December 2013. For the purpose of analysis of data collected following study group were formed.:

- Premature care unit (P.C.U.): Neonates admitted who are born at SDM Hospital
- Intensive premature care unit (I.P.U.): Neonates admitted who are born outside SDM Hospital.

Incidence of neonatal septicemia

There were around 1900 deliveries taken place at Santokba Durlabhji Memorial Hospital in the year 2013. Neonates (n=410) admitted in P.C.U. with some clinical manifestations. Neonatal sepsis suspected in around 150 admitted neonates but only 61 neonates had blood culture proven sepsis. Calculated from total deliveries neonatal sepsis rate was 32.1 per 1000 live birth.

A study published in the journal of pediatrics also had similar rate of sepsis.[11] The incidence of suspected neonatal sepsis was 36.6% but only 14.9% have blood culture proven neonatal sepsis in P.C.U. which was lesser than a study (22%) conducted in tertiary care hospital at Gangtok, Sikkim and in study (19.2%) conducted at govt. medical college and hospital Chandigarh.[12,13] In I.P.U. 312 neonates had been admitted in the year 2013 out of which 68 neonates had positive blood culture. The incidence of blood culture proven neonatal sepsis was 21.8%, which is close to study (22%) conducted at tertiary care hospital at Gangtok, Sikkim.[12]

Table 1 shows significant difference in blood culture proven cases among P.C.U. and I.P.U (p value 0.016244, <0.05). The difference between two units could be due to better care in labour room and proper post-natal handling (using gloves, apron, gown, hand rubs etc.) for neonates delivered at SDM Hospital.

In total (Figure 1) 722 neonates had been admitted in neonatal intensive care unit during the year 2013 and 129 neonates had positive blood culture. The incidence of blood culture proven sepsis was 17.86% which is close to study (19.2%) conducted at govt. medical college and hospital Chandigarh.[13]

Bacterial/ fungal isolates

Table 2 and Table 3 describes percentage of bacterial and fungal isolates in blood cultures and pattern of antibiotic sensitivity. Among bacteria gram negative organisms (24.81%, 32/129) were more common than gram positive organisms (21.71%, 28/129) which can be compared with many studies done in different parts of India, all were suggestive of gram-negative organism predominance over gram positive organisms.[12,13]

National neonatal perinatal database report 2002-2003 also suggestive of gram negative organisms predominated over gram positive organisms.[6] Staphylococcus spp were the most prevalent gram positive bacteria in this study which was comparable to the study done in a tertiary hospital of Africa.[14]

Among gram negative bacteria Klebsiella pneumoniae being the most common isolate (Table 4). A study conducted over the etiology and antimicrobial resistance of the neonatal sepsis at a tertiary care centre in eastern India also showed comparable results.[15] The incidence of Acinetobacter baumannii was 6.98% in present study. A constant and significant rise in the incidence of Acinetobacter spp was observed in a retrospective study of bacterial isolates from cases of neonatal septicemia over a period of 5 years at the Govt. Medical College and Hospital, Chandigarh.[13] Blood culture proven fungal septicemia constituted 39.53% of cases in neonatal intensive care unit in the year 2013. Among fungi, candida albicans was the major pathogen. A study published in Indian journal of pediatrics also showed candida albicans as a major pathogen among fungi.[16] However, overall incidence of fungal septicemia was low (6.8%) in that study.[16]

Pattern of antibiotic sensitivity

Majority of organisms isolated were resistant to commonly used antibiotics.

Sensitivity percentages

- Ampicillin (00.00%)
- Ampicillin sulbactam (13.33%)
- Amikacin (23.08%)
- Gentamicin (25%)
- Piperacillin tazobactam (22.22%)

A study published in NJIRM also suggestive of increasing resistance to commonly used antibiotics.[15] Among fungi maximum sensitivity was seen by Voriconazole (100% sensitive in 47 cases) followed by amphotericin B (89.36%) and then fluconazole (82.98%). Among bacteria maximum sensitivity was shown by Tigecycline (89.47%) followed by Linezolid (77.78%) and then Vancomycin (70.59%), Tetracycline (70%), Meropenem (38.46%). Pattern of antibiotic sensitivity was slightly differed in P.C.U./I.P.U. blood culture isolates (Table 5 and Table 6).

NNPD 2002-2003 report showed antibiotics were used in 12.9% of cases whereas in present study antibiotics were used in all cases.[6] This difference was due to data collected in present study include blood culture proven neonatal cases only. Similarly, oxygen therapy (8.2%), phototherapy (5.7%), I/V fluids (10.9%), assisted ventilation (2.2%), blood/plasma transfusion (2.2%) was given to small proportion of population as compared to present study.

In I.P.U. (Table 7) antibiotics and intravenous fluid given to majority of neonates (66/68, 97.05%, both). Oxygen was used in 75% cases (51/68) and phototherapy was given to 48.52% cases (33/68). Assisted ventilation was provided to 33.82% cases (23/68) and plasma/blood transfusion given to 36.76% cases (25/68).

NNPD 2002-2003 report showed that the most common therapeutic intervention used for admitted babies was the administration of antibiotics (84.2%) followed by intravenous fluid administration (82%) and oxygen administration (45.3%). Assisted ventilation was given to 23.6% cases while 32.9% received phototherapy. Blood/plasma transfusion given to 22.7% cases.[6]

Antibiotics were significantly less used (p value 0.002347, <0.05) in NNPD report.[6] This difference may be due to more cases of sick neonates (blood culture proven cases only) in present study. Similarly the proportion of modality of treatment in NNPD report was less as only culture proven cases are included in present study.

Outcome

In P.C.U. (Table 8) out of 61 cases of blood culture proven neonatal sepsis-38 cases (62.29%) were recovered and discharged in stable condition. 7 cases (11.47%) discharged on request. 10 cases left against medical advice (16.39%) and 6 cases expired (9.83%). NNPD report 2002-2003 showed out of 145623 cases 140572 cases (96.5%) were recovered and discharged in stable condition. 1232 cases (0.09%) were left against medical advice 7365 cases expired (5%).[6]

Although mortality was high in present study (9.83%) as compared to NNPD report (5%) but these results were not statistically significant (p value 0.0867, >0.05).

In I.P.U. (Table 8) out of 68 cases of blood culture proven sepsis 45 cases (66.17%) were recovered and discharged in stable condition. 8 cases (11.76%) discharged on request. 10 cases (14.70%) left against medical advice. 4 cases (5.88%) were expired and 1 case was referred to other hospital.

NNPD report 2002-2003 showed 7638 cases (69.3%) were recovered and discharged in stable condition. 76 cases (0.7%) left against medical advice. 1860 cases (16.9%) expired and 1447 (13.1%) cases referred.[6] Mortality rates were lower in present study (5.88%) as compared to NNPD report (16.9%). Results were statistically significant with p value 0.016 (<0.05).

CONCLUSION

Overall 722 cases admitted in NICU during the period of one-year 2013. Out of which 129 cases had blood culture proven neonatal sepsis (17.87%). 14.88% cases in P.C.U. and 21.79% cases in I.P.U. had positive blood culture sepsis with statistically significant difference (p value 0.016, <0.05). Majority of cases were candida sepsis (51/129, 39.53%) followed by gram negative organisms (32/129, 24.81%), gram positive organisms (28/129, 21.70%) and others (18/129, 13.95%). Among candida species, candida albicans was the most common strain. Candida spp. sensitive to Voriconazole (100%, 47/47), Amphotericin B (89.36%, 42/47) and Fluconazole (82.98%, 39/47). Among gram negative organisms Klebsiella pneumonia was the most common followed by Acinetobacter. Gram negative organisms were resistant to Amikacin, Meropenem, Piperacillin-tazobactam and sensitive to Ciprofloxacin, Levofloxacin and Tigecycline. Among gram positive organism's staphylococcus spp. were the most common. Resistant to Ciprofloxacin (7.69%, 1/13), Levofloxacin (7.69%, 1/13), Clindamycin (46.15%, 6/13), Gentamicin (46.15%, 6/13). Sensitive to Tigecycline (93.33%, 14/15), Linezolid (80.00%, 12/15) and Vancomycin (78.57%, 11/14). Antibiotic resistance is an emerging problem requires justified use of antibiotics.

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