Bacteriological Profile of Neonatal Sepsis and Antibiotic Susceptibility Patterns of Isolates from Neonates Admitted in Tertiary Care Hospital

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ABSTRACT:
Aim and objectives: To determine incidence and bacteriological profile of neonatal sepsis in relation to risk factors along with antibiotic susceptibility pattern of the isolates from neonates admitted in NICU of tertiary care Hospital.
Material and Methods: Study design: A prospective observational study was conducted in the Department of Paediatrics, tertiary care Hospital Over a period of two year (December 2019 -May 2021) on 150 patients, after getting clearance from the ethical Committee. All babies were admitted in NICU with risk factors or clinical features of neonatal sepsis or those evaluated for sepsis during their admission period, were included in the study, after taking written consent from their parents. A detailed history and thorough examination were done of all babies enrolled and their sepsis screen was sent.
Results: The sepsis screen analysis of all the enrolled patients showed that, out of all sepsis positive cases, cases 23 (42.59%) had a gram-positive infection while 31(57.41%) cases had a gram-negative infection. 13 (56.5%) cases of all Gram-positive sepsis patients had Staphylococcus aureus infection, while 18(58.06%) cases of Gram negative sepsis patients had Klebsiellapneumoniae infection. It was observed that >50% Gram positive organisms were sensitive to Meropenem, Amikacin and Vancomycin Linezolid While >50% Gram negative organisms were sensitive to Meropenem and Piperacillin + Tazobactam and Colistin
Conclusion: Thus, it can be concluded from the data that an empirical antibiotic therapy of Piperacillin +Tazobactam and Amikacin would be most efficacious in our set up as first line antibiotics rather than the combination of Ampicillin and Gentamycin which were being used up till now.

INTRODUCTION

Neonatal sepsis is a worldwide problem that presents a dynamic challenge to paediatricians. Globally, more than 40% of under-five deaths occur in the neonatal period, resulting in 3.1 million new born deaths each year.[1] Globally, the major causes of neonatal deaths are prematurity (28%), sepsis (26%), and asphyxia (23%).[2]Sepsis is more common in developing countries when compared with developed countries. South Asia and Sub Saharan Africa have the highest burden of neonatal sepsis in the world. Studies have recorded an incidence of neonatal sepsis between 11 - 24.5/1000 live births in some Asian countries. Of the total sepsis related neonatal deaths in 2013, 38.9% occurred in South Asia.[3] Nearly, 0.75 million neonates died in India in 2013.[4] The Infant Mortality Rate in India was 40.5/1000 live births as per the 2016 CIA World Fact book. National Neonatal Perinatal Database (NNPD, 2002- 2003) from India has reported an incidence varying from 0.1% to 4.5%. The current Indian neonatal mortality rate is 24 per 1000 live births and in Andhra Pradesh, it is 23 per 1000 live births.[5] Sepsis is the one of the major causes of neonatal mortality and morbidity in India. Sepsis can be defined as "a clinical syndrome characterized by systemic signs and symptoms of bacteraemia during the first 28 days of life".[6]Neonatal sepsis is divided into two groups based on the time of presentation after birth: early-onset sepsis (EOS) and late-onset sepsis (LOS). EOS refers to sepsis in neonates at or before 72 hours of life (some experts use seven days). In severe cases, the neonate may be symptomatic at birth. LOS is defined as sepsis occurring at or after 72 hours of life. This classification has clinical importance, as early onset neonatal sepsis is generally acquired from pathogens of maternal genital tract, whereas late onset sepsis has its origin either from the community or from hospital. About 62% of the infections in South Asia occur in the first 72 hours of life, roughly translating into an incidence of 9.8 per 1000 live births.[7]Gram negative organisms are found more frequently than Gram positive organisms as evidenced by many Indian studies. The clinical presentation is often subtle or nonspecific and usually mimicked by several other disorder. Multidrug antibiotic resistance is an emerging problem in neonatal intensive care units particularly in developing countries. Neonatologists who supervise neonatal intensive care unit (NICU) always face a continuous challenge in managing the neonatal infections due to the changing patterns of the microbial flora. The knowledge of bacteriological profile and its antibiotic sensitivity pattern is of great use to paediatricians in choosing antibiotics optimally to treat neonates with septicemia. In suspected clinical sepsis, rational empirical therapy has to be started. Antibiotics should be

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re-evaluated when the results of the cultures and sensitivity are available.[8-10]Hence the present study was conducted to determine incidence and bacteriological profile of neonatal sepsis in relation to risk factors {sex, age, birth weight, gestational age and mode of delivery} along with antibiotic susceptibility pattern of the isolates from neonates admitted in neonatal intensive care unit of Krishna hospital, Karad.

MATERIALS AND METHODS

Study design: A prospective observational hospital based study of 24 months on all babies admitted in NICU in the with risk factors or clinical features of neonatal sepsis or babies who required evaluation for sepsis during the period of stay in the NICU were include in the study carried out Department of Paediatrics, tertiary care Hospital., Karad which is a tertiary care hospital. Using a prevalence of 10% according to study conducted by Niraj Kumar et al., "Bacteriological profile and sensitivity pattern in neonatal sepsis in tertiary care centre in Bareilly" , a total sample size of 150 was calculated using the formula :-n= $4PQ/L^2$. With the inclusion criteria. All babies admitted in NICU with risk factors or clinical features of neonatal sepsis or babies who required evaluation for sepsis during the period of stay in the NICU. Neonates with multiple/ gross congenital malformations and Neonates with complex congenital heart disease were excluded from the present study

Method: The study comprised ill new born who were born via C-section or spontaneous vaginal delivery and did not receive any antibiotics prior to the procedure. New-borns exhibiting one or more of the following symptoms were considered to have neonatal sepsis: fever (>38 °C) or hypothermia (<36 °C), Convulsions, lethargy, feeding difficulties, breathing difficulties, hypoglycemia, vomiting, bulging fontanels, respiratory distress, jaundice, and symptoms of infection on the skin and umbilical pus discharge or hyperaemia. Before collecting blood samples, the location was cleansed twice with a 70% isopropyl alcohol solution. Two milliliters of venous blood was collected aseptically from each neonate's antecubital fossa and dispensed into a sterilized universal bottle containing 20 ml of tryptone soy broth to make a 1:10 dilution. During culture and isolation, microbiological protocol was strictly followed, including the use of sterile loops. Blood culture samples were then brought to the laboratory within one hour and cultured for 24 hours at 37 °C. Each sample was sub cultured on blood chocolate agar and MacConkey agar, both of which were commercially prepared. The sub-cultured agars were incubated at 37 °C and growth was monitored. Samples that did not demonstrate growth after 24 hours were monitored for 7 days before being labelled as having no growth. Antimicrobial susceptibility testing was performed against relevant antibiotics and the data analysed (using Statistical Package for Social Sciences, version 23 – SPSS Inc., Chicago, IL).

RESULTS

In this prospective study from December 2019 to November 2021, the total no of admissions in NICU during the study period were 1626. Out of these 150 neonates fulfilled the criteria for neonatal sepsis. The incidence of neonates with sepsis in NICU during this study period was 9.2 per 100 NICU admissions.

Table 1: Base line characteristics.

Characteristics		Number (%)
Onset of sepsis	0-72 hrs	92 (61.33 %)
	72hr-28days	58 (38.67 %)
Gender	M:F	86:64(57:42 %)
Gestation	Term	53 (35.33%)
	Preterm	97 (64.67 %)
Birth Weight	<2.5 kg	84 (56.00%)
	> 2.5 kg	66 (44.00%)
Mode of delivery	NVD	68 (45.33%)
	LSCS	47 (31.33%)
	AVD	35 (23.33%)
Category of sepsis	Clinical sepsis	61 (40.67%)
	Probable sepsis	35 (23.33%)
	Proven sepsis	54 (36.00 %)

In the present study we assessed Blood Culture reports among the study subjects. We observed that blood cultures were positive among 54 (36%) study subjects and blood cultures were negative among 96(64%) study subjects. We assessed the association of maternal risk factors among different categories of sepsis among the study subjects. We observed that advanced maternal age, presence of maternal fever and administration of

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Intrapartum IV antibiotics were the maternal risk factors which were significantly associated with proven sepsis group. The incidence is as given in the (table 2)

Table 2: Maternal Risk Factors presentation in relation to different Categories of sepsis among the study subjects.

Maternal risk factors		Clinical sepsis	Probable sepsis	Proven sepsis	P-value
Maternal age	Less than 20	17	11	21	The chi-square statistic is 1.5817. The p-value is .045
	More than 20	44	24	33	
PROM >18 hrs	Yes	3	4	7	The chi-square statistic is 2.4275. The p-value is 0.297
	No	58	31	47	
ANC visits (Ante Natal Check-ups)	More or equal to 8 visits	27	17	22	The chi-square statistic is 0.5314. The p-value is .766.
	Less than 8 visits	34	18	32	
Foul smelling liquor	Yes	5	7	8	The chi-square statistic is 2.8415. The p-value is 0.241
	No	56	28	46	
Maternal fever	Yes	49	27	52	The chi-square statistic is 7.638. The p-value is 0.021
	No	12	8	2	
Chorioamnionitis	Yes	2	1	1	The chi-square statistic is 0.2292. The p-value is 0.891
	No	59	34	53	
Maternal UTI (Urinary Tract Infections)	Yes	4	2	1	The chi-square statistic is 1.5382. The p-value is 0.463
	No	57	33	53	
Multiple PV (Per Vaginal) examination	>5 times	4	5	7	The chi-square statistic is 1.8609. The p-value is 0.394
	Less than 5 times	57	30	47	
Intrapartum IV (Intravenous) antibiotics	Yes	14	16	31	The chi-square statistic is 14.576. The p-value is 0.0006
	No	47	19	23	

In the present study we noted the Culture isolates among the 54 study subjects with positive blood culture. We observed that Klebsiellapneumoniae was reported among 18 (33.33%) study subjects, Staphylococcus aureus was reported among 13 (24.07%)study subjects, Acinetobacterbaumanii was reported among 4 (7.41%) study subjects, Escherichia coli was reported among 7 (12.96%) study subjects, Group B Streptococci was reported among 4 (7.41%) study subjects, Pseudomonas aeruginosa was reported among 3 (5.56%) study subjects, Burkholderiacepacia was reported among 2 (3.70%) study subjects, Coagulase negative staphylococci were observed among 3 (5.56%) study subjects. (Table3)

Table 3: Culture isolates among the study subjects with positive blood culture

Culture isolates	Number of subjects	Percentage
Klebsiellapneumoniae	18	33.33
Staphylococcus aureus	13	24.07
Acinetobacterbaumanii	4	7.41
Escherichia coli	7	12.96
Group B Streptococci	4	7.41
Pseudomonas aeruginosa	3	5.56

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Burkholderiacepacia	2	3.70
Coagulase negative staphylococci	3	5.56
Total	54	100

In the present study we assessed Antibiotic sensitivity among gram negative organisms among the study subjects. Klebsiella showed maximum sensitivity to the meropenem, imipenem, colistin, piperacillin-tazobactam, amikacin in decreasing order. E-Coli showed sensitivity to meropenem, colistin, imipenem, and piperacillin-tazobactam. Pseudomonas showed sensitivity to the colistin, piperacillin-tazobactam and amikacin. Burkholderiacepacia showed sensitivity to meropenem, colistin, piperacillin-tazobactam, levofloxacin, amikacin. Acinetobacter showed sensitivity to the colistin, amikacin, meropenem in decreasing order. (Table 4)

Table 4: Antibiotic sensitivity among gram negative organisms among the study subjects

Antibiotics	Acinetobacterb aumanii	Klebsiellapne umoniae	Escherica coli	Pseudomonas aeruginosa	Burkholderia cepacia
Meropenem	2 (50%)	18 (100%)	7 (100%)	1 (33.33%)	1 (50%)
Imipenem	2 (50%)	18 (100%)	7 (100%)	1 (33.33%)	1 (50%)
Amoxicillin	0	1 (5.5%)	1 (14.28%)	0	0
Amikacin	3 (75%)	14(77.7%)	4 (57.14%)	2 (66.66%)	1 (50%)
Colistin	4 (100%)	15 (83.3%)	7 (100%)	2 (66.66%)	1 (50%)
Levofloxacin	1 (25%)	11 (61.1%)	4 (57.14%)	1 (33.33%)	1 (50%)
Gentamycin	0	10 (55.5%)	3 (42.85%)	0	0
Piperacillin/tazobactam	1 (25%)	15 (83.33%)	6 (85.71%)	2 (66.66%)	1 (50%)
Ceftriaxone	0	3 (16.6%)	2 (28.57%)	0	0
Cefuroxime	0	10 (55.5%)	4 (57.14%)	1 (33.33%)	0
Cefoperazone / Sulbactam	1 (25%)	11 (61.1%)	4 (57.14%)	1 (33.33%)	1 (50%)
Cefepime	0	8 (44.4%)	2 (28.57%)	0	0

In the present study we assessed Antibiotic sensitivity among gram positive organisms among the study subjects and noted that Staphylococci, Group B streptococci and Coagulase negative staphylococci showed sensitivity for vancomycin, linezolid, amikacin, teicoplanin, Levofloxacin and cefoxitin in decreasing fashion. (Table 5)

Table 5: Antibiotic sensitivity among gram positive organisms among the study subjects

Antibiotics	Staphylococci	Group B streptococci	Coagulase negative staphylococci
Clindamycin	4 (30.76%)	1 (25%)	0

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Linezolid	13 (100%)	4 (100%)	3 (100%)
Teicoplanin	11 (84.61%)	3 (75%)	2 (66.66%)
Vancomycin	13 (100%)	4 (100%)	3 (100%)
Gentamycin	5 (38.46%)	1 (25%)	0
Erythromycin	5 (38.46%)	1 (25%)	0
Amikacin	11 (84.61%)	3 (75%)	2 (66.66%)
Ampicillin	5 (38.46%)	1 (25%)	1 (33.33%)
Ciprofloxacin	8 (61.53%)	1 (25%)	1 (33.33%)
Levofloxacin	10 (76.92%)	1 (25%)	1 (33.33%)
Cefoxitin	10 (76.92%)	1 (25%)	1 (33.33%)
Cefuroxime	8 (61.53%)	2 (50%)	1 (33.33%)
Oxacillin	3 (23.07%)	1 (25%)	0

DISCUSSION

In this prospective study from December 2019 to November 2021, the total no of admissions in NICU during the study period were 1626. Out of these 150 neonates fulfilled the criteria for neonatal sepsis. The incidence of neonates with sepsis in NICU during this study period was 9.2 per 100 NICU admissions.

This was similar to that observed by Jamba Jatsho et al., [11] who found an incidence of 13.9% i.e., 321 out of 2313 NICU admissions in their hospital. In the present study we assessed Gender wise distribution among the study subjects. We observed that majority of the study subjects were males 86 (57.33%), and 64 (42.67%) were females. The M: F ratio in the current study was 1.34:1. These observations are similar to the observations by SangitaThapa et al. In their study, they observed that Neonatal sepsis was more common in males (66%) than in females (33.9%), which is consistent with earlier research that found a greater incidence of septicemia in boys ranging from 59 to 82 percent.[12]SangitaThapa et al., attributed this to the priority given to the male babies for the medical care in the society.In the present study we assessed Onset of sepsis among the study subjects. We observed that majority of subjects had Early onset sepsis 92 (61.33%), and 58 (38.67%) subjects had Late onset sepsis. Similarly, SangitaThapa et al, in their study found that early onset sepsis was (62.5 percent) more common than late onset sepsis (37.5 percent), a finding shared by Assudani et al. 2017 and Hafsa et al. 2011. In their investigation, Jyothi et colleagues found that 98 (74.8 percent) of the isolates were from early-onset septicemia cases, while 33 (25.2 percent) were from late-onset disease.[12] On the contrary, according to Muhammad et al. (2010), late-onset sepsis was more common than early-onset sepsis. The greater risk of EOS found in our study could be attributed to early horizontal transfer of pathogens from the NICU and delivery rooms, or to vertical transmission of these pathogens established in the maternal vaginal canal following unsanitary obstetric practices. LOS is induced by postnatal pathogen acquisition, which is caused by

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microorganisms that thrive in the hospital or home environment. Adequate knowledge and maintenance of cleanliness, hygiene, and adapting strict aseptic practices in our hospital by doctors and medical staff could explain the lower prevalence of late-onset sepsis in our study. However, the decreased LOS rate in any hospital cannot be explained by a single cause. Various changes in recent years, in addition to increased awareness in sepsis prevention, such as better hand hygiene practices, maintaining standard protocols in handling intravenous catheters, and shorter duration of invasive ventilation due to the use of surfactants, may have contributed to the decreased incidence of LOS in all these studies.LBW and preterm neonates are more likely to develop sepsis than term neonates because of their inherent sensitivity to infection due to an underdeveloped immune system, as well as additional variables such as a longer hospital stay, complete parenteral feeding, and exposure to invasive procedures.In the present study we assessed Gestational age of the study subjects. We observed that majority of the babies were preterm 97 (64.67%), and 53 (35.33%) subjects were term. Majority of the neonates had birth weight less than 2.5 kg 84 (56%), whereas 66 (44%) had birth weight of more than 2.5 kg.These findings are consistent with the studies in 2019 by Wani GR et al., who observed that neonatal sepsis was more common in low birth babies than normal weight babies (77.5% vs 22.5%) which is also in accordance to studies of IyerCR et al and Rajana R et al. Wani et al., described that "this could be because of immunological immaturity and overall high risk behavior of low birth neonates" .During labour, the fetus is at danger of being exposed to the colonized microbial flora in the mother vaginal canal. The interaction with pathogens during delivery, as opposed to the sterile in-utero environment, is responsible for the high level of culture positivity rates among neonates delivered by AVD/NVD rather than LSCS. In the present study we assessed Mode of delivery among the study subjects. We observed that 68 (45.33%) neonates were delivered via NVD (normal vaginal delivery), 47(31.33%) via LSCS (Lower Segment Caesarean Section), and 35(23.33%) via AVD (Assisted Vaginal Delivery).Furthermore, in our current study, the rate of culture-proven sepsis was somewhat greater among neonates delivered via NVD compared to those delivered via LSCS. Tallur et al.[13] (2007) and Shrestha P et al.[14] (2007) both claimed that newborns born via NVD had higher rates of culture positivity than newborns born via LSCS which is consistent with our findings.Despite the fact that the AVD devices were properly sterile, the variance in results of all the studies could be attributed to early membrane rupture and contamination from the environment during delivery.In the present study we assessed the association of maternal risk factors among different categories of sepsis among the study subjects. We observed that advanced maternal age, presence of maternal fever and administration of Intrapartum IV antibiotics were the maternal risk factors which were significantly associated with proven sepsis group. (Table 2).In the present study we categorized study subjects into those with Clinical Sepsis, Probable Sepsis or Proven Sepsis. We observed that 61(40.67%) subjects had clinical sepsis, 35(23.33%) subjects had probable sepsis, and 54(36%) subjects had proven sepsis i.e., culture positive sepsis. (Table 1).In the present study we assessed Blood Culture reports among the study subjects and observed that blood cultures were positive among 54 (36%) study subjects and blood cultures were negative among 96(64%) study subjects.Similar results were found by Sarasamet al.[15] (2014) who showed a much higher incidence rate (36.4 percent) than Al-Shamahy et al[16] (2012) (57 percent). Ansari et al. 2015[17] (9.8 percent) and Mudzikatiet al.[18]2015 (9.8 percent) (12.6 percent). Nepal et al. (2013) reported a lower incidence rate of 2.1 percent, and Raha et al (8.9 percent). The variation in culture positivity rate in neonatal sepsis among different studies could be attributed to differences in sample size, prior antibiotic administration prior to sample collection, infection with anaerobes, viral or fungal pathogens, and effective control of nosocomial infection spread.In their study, Jyothi et al found that 131 of the 683 clinically suspected cases of sepsis were culture positive, with a blood culture positivity rate of 19%.[132] Sharma et al. and Jain et al., on the other hand, observed a high blood culture positivity rate (56%) in children with sepsis.In the present study we assessed Gram staining among the 54 culture positive study subjects. We observed that gram negative organisms were noted among 31(57.41%) study subjects, and among 23 (42.59%) study subjects, gram positive organisms were noted which is comparable to a study conducted by Agnihotri*et al.*, which reported that Gram-negative and Gram-positive organisms were responsible for 59% and 41% of the cases of culture positive sepsis, respectively. Similar observations were made by other workers.[19] P Jyothi et al in their study observed that the incidence of Gram-negative and Gram-positive organisms was 55.7% and 44.3%, respectively.[20]The gram negative organisms were isolated in 85% of cases in studies by Wani GR et al., which is also consistent with studies done by Mathur M et al, RasulCHet al and Jaswal RS et al.The probable reason for more cases of gram negative compared to gram positive could be that most of gram negative organisms are normal commensals and neonates are less protected against them because of low IgM antibodies.Failure to follow strict aseptic precautions at peripheral centers when undergoing delivery puts the neonate at risk of infection, with the prevailing hospital flora accounting for the bulk of extramural sepsis. Klebsiellapneumoniae and Staphylococcus aureus are the most common pathogens associated with neonatal sepsis in India. Pathogens most commonly associated with newborn sepsis in poor nations differ from those seen in industrialized countries. Gram-negative organisms are more frequent in general, with Klebsiella, Escherichia coli, Pseudomonas, and Salmonella being the most common. Staphylococcus aureus, CONS, Streptococcus pneumoniae, and Staphylococcus pyogenes

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are the most often isolated Gram-positive pathogens. According to the National NeonatalPerinatal Database study, Klebsiella was the most common pathogen (29 percent). In our study, we also found that Klebsiellapneumoniae was reported among 18 (33.33%) study subjects, Staphylococcus aureus was reported among 13 (24.07%) study subjects, Acinetobacterbaumanii was reported among 4 (7.41%) study subjects, Escherichia coli was reported among 7 (12.96%) study subjects, Group B Streptococci was reported among 4 (7.41%) study subjects, Pseudomonas aeruginosa was reported among 3 (5.56%) study subjects, Burkholderiacepacia was reported among 2 (3.70%) study subjects, Coagulase negative staphylococci were observed among 3 (5.56%) study subjects. Acinetobacter is a nosocomial pathogen, and it is likely that newborns are being infected by hospital pathogens, cross-contamination between patients, or lapses in infection control practices in hospitals during deliveries, which could explain why Acinetobacter was found to be the isolate in EOS, according to the previous findings made by Arora et al. 2006.

Zakariyaet al[21] (2011) identified Klebsiella species and S. aureus as the most common causes of EOS which is consistent with our study. SangitaThapa et al found that the majority of isolates causing neonatal septicemia (69.6 percent) were gram-negative isolates (Klebsiellapneumoniae and CONS were identified as the most prevalent isolates in EOS), similar to the findings of Roy et al. 2002 and investigators of the Delhi Neonatal Infection Study (DeNIS) Collaboration. Other investigations conducted in Nepal and Pakistan have also found a predominance of gram-negative bacilli. Other international investigations, on the other hand, identified gram-positive cocci such as S. aureus, CONS, and so on.[22]Antibiotic resistance is now a worldwide issue. In developing nations, reports of multi drug resistant bacteria causing newborn sepsis are on the rise. This scenario could be explained by the widespread availability of over-the-counter medicines and the inappropriate usage of broad-spectrum antibiotics in the community. Because the epidemiology of newborn sepsis is so heterogeneous, comparing antibiotic resistance across nations is difficult. The pattern of antimicrobial susceptibility differs from place to place, which is important in the optimal management of neonatal sepsis. A thorough understanding of the pattern of antibiotic sensitivity in the region aids in the selection of preventive medicines.The antibiotic susceptibility pattern of all isolates causing neonatal sepsis was investigated.In this work, we looked at antibiotic sensitivity in gram-negative organisms among the study subjects. Klebsiella showed maximum sensitivity to the meropenem (100%), Imipenem (100%), colistin (83.3%), piperacillin-tazobactam (83.33%), and amikacin (77.77%) in decreasing order. E-Coli showed maximum sensitivity to meropenem (100%), colistin (100%), imipenem (100%), piperacillin-tazobactam (85.71%).Pseudomonas showed sensitivity to the colistin (66.66%), piperacillin-tazobactam (66.66%) and amikacin (66.66%). Burkholderiacepacia showed sensitivity to meropenem (50%), colistin (50%), piperacillin-tazobactam (50%), levofloxacin (50%), amikacin (50%).Acinetobacter showed sensitivity to colistin (100%), amikacin (75%), and meropenem (50%). (Table 4) These observations are similar to observations by Muley et al. in 2015, other studies conducted both within and outside of Nepal revealed a similar outcome, namely that both gram-positive and gram-negative organisms were highly susceptible to carbapenems.

In their study, SangitaThapaet al[12]found that antibiotic resistance among gram-positive and gram-negative bacteria was quite high to indicated medications such as ampicillin, cephalosporins, and aminoglycosides. The studies of Nepal et al. [11] (2013) and Ansari et al.[17] (2015) of neonatal sepsis, both published from the same hospital, and Gyawali and Sanjana (2013) from a different hospital but the same area, also showed a similar resistance pattern. The rise in resistance over the previous five years could be attributed to the establishment of resistant strains as a result of indiscriminate and excessive antibiotic usage at private clinics and primary health care facilities from which neonates are referred to our facility.In the present study we assessed Antibiotic sensitivity among gram positive organisms among the study subjects. Staphylococci, showed maximum sensitivity to Vancomycin (100%), Linezolid (100%), Amikacin (84.61%), teicoplanin(84.61%), Levofloxacin (76.92%) in decreasing fashion.Group B streptococci showed maximum sensitivity to Vancomycin (100%), Linezolid (75%), Amikacin (75%)Teicoplanin (75%) in decreasing fashion. Coagulase negative staphylococci showed maximum sensitivity to Vancomycin (100%), Linezolid (100%), Amikacin (66.6%), and Teicoplanin (66.6%) in decreasing fashion. (Table 5)

CONCLUSION

Thus, we can conclude from our data that an empirical antibiotic therapy of Piperacillin +Tazobactam and Amikacin would be most efficacious in our set up as first line antibiotics rather than, the combination of Ampicillin and Gentamycin which were being used till now.

LIMITATIONS

Since this was not a normal case control analysis, the risk factor analysis was weak as there was no comparison with aseptic neonates. Even with all the necessary precautions, improper collection technique, unavailability of neonatal culture micro vials, and anaerobic cultures may have limited the blood culture positivity.

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