IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 16, Issue 10 Ver. VIII (Oct. 2017), PP 42-49
www.iosrjournals.org

Neonatal Sepsis:Magnitude, Antibiogram And Outcome in A Tertiary Care Hospitalof Kolkata.

*Dr. Dibyendu Raychaudhuri,**Dr.Debasis Das,

**Assistant Professor, Department of Paediatrics, Medical College, Kolkata*

***Associate Professor, Department of Community Medicine, Medical College Kolkata,*
Corresponding Author:Dr.Debasis Das

Abstract:
Introduction:*Sepsis is one of the commonest & major cause of neonatal morbidity and mortality. Sepsis alone contribute 30-50%of the total neonatal deaths in developing countries like India.[1,2]In March 2002, CDC launched a campaign to reduce prevalence of antibiotic resistance. It recommends "use local data" byusing institution's antibiogram.[(20)]*
Objectives:*The study was aiming at assessing the proportion of neonatal admission and death due to all causes in NICU and SNCU of Medical College, Kolkata; finding out causative organism of sepsis; sensitivity and resistance to antimicrobial agents.*
Methodology:*It was a descriptive observational study, longitudinal in design conducted at NICU and SNCU of Medical College, Kolkata duringOctober 2016 to May 2017. All the 940 clinically suspected sepsis cases among 3313 total admitted cases were taken. Among these,antibiogram was done for 620 sepsis screen positive cases.*
Result:*Among3313 admission, 940(28.37%) were clinical Sepsis; 620 cases were sepsis screen positive which were put on culture among which 341(55%) culture positive cases were found; prevailing flora were Klebsiella, CONS, Acinatobactor, E.coli. Antibiogram showedmost of the organisms are highly sensitive to Amikacin and remarkably resistant to Cefotaxime.*
Conclusion: *No single recommendation for the antibiotic regimen of neonatal sepsis for all settings is possible.Choice of antibiotics depends on the prevailing flora in the given unit and their antimicrobial sensitivity and resistance pattern. Review of antibiogram should be done in a routine interval to cope up with changing microbial pattern and drug resistance.*
Keywords: *Sepsis, Magnitude, Antibiogram, Neonate, Kolkata.*

Date of Submission: 04 -10-2017 Date of acceptance: 18-10-2017

I. Introduction

Neonatal sepsis is a clinical syndrome characterized by signs and symptoms of infection with or without accompanying bacteraemia within the first 28 days of life. It encompasses various systemic infections of the newborn such as septicaemia, meningitis, pneumonia, arthritis, osteomyelitis and urinary tract infection. Sepsis is one of the commonest cause of neonatal morbidity and mortality. Sepsis alone contribute 30-50%of the total neonatal deaths in developing countries like India.[1,2] In the year 2010, an estimated 7.7 million childhood deaths occurred among which 3.1 million occurred in the neonatal period .[3] India contributes to around one-quarter of all neonatal deaths in the World and more than half (52%) of these are estimated to occur due to infections.[4] If proper supportive care and rational antimicrobial therapy are given for prevention and treatment of sepsis, neonatal mortality rate can be reduced to a great extent.

Depending on the age of onset and causative organism, the clinical presentations of neonatal sepsis are much varied.[1]Klebsiella, E coli, Staphylococcus aureus are common causes of neonatal sepsis in India.[2]It presents as various systemic infections of the newborn such as septicaemia, meningitis, pneumonia, arthritis, osteomyelitis, and urinary tract infection.As per National Neonatal Perinatal Database (NNPD, 2002-03), the incidence of neonatal sepsis is 30 per 1000 live births and sepsis is one of the commonest causes of neonatal mortality contributing to 19% of all neonatal deaths.[5] Neonatal sepsis is of two types; early onset and late onset sepsis. Early Onset Sepsis (EOS) presents within first 72 hours of life. In severe cases, the neonate may be symptomatic at birth. Infants with EOS usually present with respiratory distress and pneumonia. The source of infection is generally contracted from the maternal genital tract.[6]Late onset sepsis usually presents after 72 hours of age. The source of infection is either nosocomial or community acquired and neonates usually present with septicaemia, pneumonia or meningitis.[5]

Early diagnosis and proper management of neonatal sepsis can reduce the neonatal mortality but as aetiological agent do not remain the same and include a wide variety of both gram positive and gram negative bacteria,one should know the usual aetiological agent and its antibiotic susceptibility pattern in the community, before commencing empirical therapy.

The present study was conducted to determine the bacteriological profile in the suspected cases of neonatal sepsis and to know the pattern of antibiotic susceptibility in the Neonatal Intensive Care Unit(NICU) and Special Newborn Care Unit(SNCU) of a tertiary care centre in Kolkata.

II. Methodology

Type of study: It was a descriptive observational epidemiological study, longitudinal in design.

Place of study:NICU and SNCU of Medical College, Kolkata.

Duration of study: It was conducted over eight months from October 2016 to May 2017.

Population under study: All the 940 clinically suspected sepsis cases among 3313 total admitted cases in NICU & SNCU constitutes population of study.Among these antibiogramwas done for 620sepsis screen positive cases.

Objectives: The study was aiming at assessing the proportion of neonatal admission and death due to all causes in NICU and SNCU of Medical College, Kolkata; finding out causative organism of sepsis; sensitivity and resistance to antimicrobial agents to facilitate management of cases.

Materials: A predesigned & pretested data collection form, blood testing reagents and reagents for sepsis screening, McConkey agar plate for culture, Vitek 2 Machine for identification of species, materials for antibiogram.

Method of study: Sepsis was suspected clinically by lethargy, refusal of feed, respiratory distress, hypotonia, convulsions, abdominal distention, diarrhea etc. Sepsis screen was done on these cases. Five parameters were considered for screening of sepsis were: a) Total Leucocyte count less than 5000/ cmm, b) Absolute Neutrophil Count low as per Manroe chart for term and Mouzinho's chart for very low birth weight infants, c)Immature/total neutrophil>0.2, d) Micro-ESR more than 15 mm in 1st hour and e) C-Reactive Protein More than 1 mg/dl (ref range vary according to kit manufacturer reference).Presence of two abnormal parameters in a screen is associated withsensitivity 93-100% andspecificity 83% with Positive predictive value 27% and Negative predictive value 100%. If two or more parameters are abnormal, cases wereconsidered positive for sepsis and blood sample taken for culture and sensitivity and empirical antimicrobials were started. If Screen is negative despite strong clinical suspicion, screen should be repeated within 12 hours.If still negative, sepsis can be excluded.From sepsis screen positive cases or sometimes strong clinically suspected cases blood sample were collected in the culture bottle and incubated in an automated incubator at 37^0C temperature. Positive blood culture cases were inoculated on Blood or McConkey agar plate and incubated at 37^0C temperature overnight. From appeared colonies gram positive and gram negative organism were identified by staining. Then,colonies were put in Vitek 2 machine for identification of organism and antibiogram. According to report of antibiogram the antimicrobial agents were modified when needed. Follow up of all cases were done to see the outcome.

III. Result

During October 2016 to May 2017 a total of 3313 cases were admitted in NICU-SNCU complex of Medical College, Kolkata; average admission being 414.13/ month and 13.80/day. Among these, intramural cases were 2600(78.48%) and extramural were 713(21.52%). Month-wise admission of both intramural and extramural cases are given in Figure 1.

Among admitted 3313 cases 1358(40.99%) were having normal birth weight and the rests (59.01%) were low birth weight babies. 1551(46.82%) had birth weight between 1500-2499 grams, 337(10.17%) had 1000-1499 grams and 67(2.02%) were having less than 1000 grams. Low birth weight neonates were found highest in the month of March 2017 (33.16%). (Table 1)Among neonates under study, 2094(63.21%) were term babies i.e., at least 37 weeks gestational age at birth and the rest (36.79%) were preterm. Preterm neonates were highest seen in the month of February 2017 (55.62%) (Table 2). Cases of low birth weight babies outnumbered the normal weight babies. LBW and premature babies were more prone to get infection.

Neonates were admitted with different morbidities – Sepsis was the leading morbidity – 940(28.37%), followed by Neonatal Hyperbillirubinemia–627(20.28%), Birth Asphyxia - 469(14.16%),Hypoglycaemia - 239(7.21), Other Respiratory distress - 237(7.15%), Hypothermia - 235(7.09%), Prematurity without any other co-morbid condition - 212(6.40%), Respiratory Distress Syndrome - 142(4.29%), Meconeum Aspiration Syndrome - 138(4.17), and Congenital Malformation - 29(0.88%) cases.(Table 3). Month-wise admission of sepsis cases were – October'16 - 60(6.38), November'16 - 106(11.28), December'16 - 195(20.74), January' 17 - 104(11.06), February'17 – 94(10.00), March'17 - 123(13.09), April'17 - 149(15.85) and May'17 - 109(11.60).

Total number of death from all causes among the cases under the study period was 421; among these 112(26.60%) were due to sepsis and prematurity each, followed by Birth Asphyxia - 95(22.57), Respiratory Distress Syndrome - 40(9.50%), Congenital Malformation - 37(8.79), Meconeum Aspiration Syndrome - 15(3.56), and 10(2.38) were due to other causes. (Table 4)

Out of 112 total death due to sepsis month-wise death during October 2016 to May 2017 were 18(30.00), 14(13.21), 11(5.64), 9(8.65), 12(12.77), 30(24.39), 8(5.37), 10(9.17) respectively.

Among 940 clinically suspected sepsis cases, 620 cases found sepsis screen positive from which blood samples were put up for culture. 341(55%) cases became culture positive. 195(57.18%) growth found withKlebsiella, 38(11.14%) Coagulase Negative Staphylococci (CONS), 35(10.26%) for Acinatobactor, 21(6.16%) for E. coli, 18(5.28%) for Staph aureus, 10(2.93%) for Citrobactor, 9(2.64%) for Pseudomonas, 5(1.47%) for Enterococcus, Streptococcus, Diphhtheroids each. (Figure 2)

For sensitivity test Amoxycillin, Amoxyclav, Piperacillin-Tazobactum, Cefuroxime, Cefriaxone, Cefotaxime, Ceftazidime, Cefixime, Cefepime, Gentamycin, Amikacin, Ciprofloxacin, Levofloxacin, Erythromycin, Etrapenem, Imipenem, Meropenem,Colistin, Doxycycline, Linezolid, Vancomycin, Teicoplanin, Clindamycin, Co-trimoxazole, Chloramphenicol and Nitrofurantoin disc were used.

620 samples were put up for culture among which 341became positive; Klebsiella was identified in 195(57.18%) cases. Kelbsiella was found sensitive to Amikacin – 114(58.46%), Levofloxacin – 60(30.77%), Meropenem -60(30.77%), Imipenem – 32(16.41%), Gentamicin – 19(9.74%), Ciprofloxacin – 19(9.74%), Piperacillin-Tazobactum – 16(8.21%), Cefotaxime – 9(4.62%), Cefoperazone-Salbactum – 7(3.59%), Tigacycline - 6(3.08%), Colistin – 6(3.08%), Polymixin – 2(1.03%), Nalidixic Acid – 2(1.03%), Doxycycline – 2(1.03%) and Co-trimoxazole – 1(0.51%). It was resistant to Cefotaxime - 117(60.00), Gentamicin - 47(24.10), Levofloxacin - 37(18.97), Amoxycillin - 67(34.36), Meropenem - 12(6.15), Piperacillin-Tazobactum - 18(9.23), Amikacin – 18(9.23%), Cefuroxime – 35(17.95%), Ciprofloxacin – 16(8.21%), Amoxycillin-Clavulanic Acid – 37(18.97%), and Cefoperazone-Sulbactum – 18(9.23%). In Klebsiella infection, sensitivity to Amikacin is highest, followed by levofloxacin, meropenem and it was resistant to Cefotaxime.

Among 341 culture positive cases 38(11.14%) was Coagulase negative staphylococci. They were sensitive to Amikacin – 16(42.11%), Levofloxacin – 7(18.42%), Gentamicin – 11(28.95%), Ciprofloxacin – 2(5.26%), Cefotaxime – 1(2.63%), Linezolid – 24(63.16%), Clindamycin – 12(31.58%), Vancomycin – 23(60.53%), Cefoperazone-Sulbactum – 1(2.63%), Doxycycline – 3(7.89%), Cefuroxime – 2(5.26), Amoxycillin-clavulanic Acid – 1(2.63%) and Erythromycin – 2(5.26%). Resistance was shown to Cefotaxime – 4(10.53%), Amikacin – 4(10.53%), Gentamycin – 6(15.79%), Cefuroxime – 7(18.42%), Ciprofloxacin, Levofloxacin&Amoxycillin – 6(15.79 %) each, Amoxycillin – Clavulanic acid – 4(10.53%).Maximum sensitivity was found toLinezolid, Vancomycin andAmikacin.

35 (10.26%) culture was found positive for Acenatobactor out of 341 culture positive cases. They were sensitive to Amikacin – 15(42.85%), Cefotaxime – 8(22.86%), Meropenem, Imipenem, Gentamycin – 6(17.14%) each, Levofloxacin – 1(2.86%), Piperacillin- Tazobactum , Co-trimoxazole– 3(8.57%) each, Cefoperazone-Sulbactum – 2(5.71%), Tigecycline, Itrapenem, Cefepime – 1(2.86%) each. They were resistant to Levofloxacin – 12(34.29%), Amoxycillin – 11(31.43%), Cefotaxime – 10(28.57%), Amoxycillin- Clavulanic Acid – 9(25.71%), Meropenem, Imipenem – 8(22.86%) each, Gentamycin, Cefuroxime, Ciprofloxacin – 6(17.14%) each, Itrapenem – 3(8.57%), Amikacin, Cefoperazone-Sulbactum – 2(5.71%) each. Highly sensitive toAmikacin, then comesCefotaxime.

21(6.16%) culture was found positive for E coli out of total 341 culture positive cases. They were sensitive to Amikacin&Cefotaxime – 5(23.81%) each, Meropenem& Gentamycin – 4(19.05%) each, Levofloxacin, Imipenem, Piperacillin-Tazobactum, Tigecycline&Colistin – 2(9.52%) each, Ciprofloxacin & Co-trimoxazole - 1(4.76%). They were resistant to Amoxycillin – 8(38.10%), Levofloxacin &Amoxycillin-clavulanic Acid – 7(33.33%) each, Cefuroxime – 3(14.29%), Cefotaxime, Amikacin, Gentamycin, Ciprofloxacin, Cefoperazone-Sulbactum&Meropenem – 1(4.76%) each. E. coli is equally sensitive to Cefotaxime and Amikacin; Resistant to Levofloxacin and Co- Amoxyclav.

18(5.28%) culture was found Staphylococcus aureus positive,was sensitive to Linezolid, Clindamycin – 7(38.89%) each, Vancomycin – 6(33.33%), Levofloxacin – 5(27.78%), Doxycycline – 4(22.22%), Amikacin, Ciprofloxacin – 3(16.67%) each, Gentamycin – 2(11.11%), Erythromycin, Cefixime – 1(5.56%) each. Staphylococcus aureus was resistant to Cefuroxime – 3(16.67%), Amoxycillin – 2(11.11%), Cefotaxime, Gentamycin, Ciprofloxacin, Levofloxacin and Amoxycillin-Clavulanic Acid – 1(5.56%) each. It was almost equally sensitive to Linezolid, Clindamycin, Vancomycin, Levofloxacin and was resistant to Cefotaxime.

10(2.93%) Cases of Citrobactor was found, sensitive to Meropenem – 2(20.00%), Amikacin, Cefotaxime, Imipenem – 1(10.00%) each.

9(2.64%) cases were found with pseudomonas growth. They were sensitive to Amikacin – 4(44.44%), Meropenem – 3(33.33%), Levofloxacin – 2(22.22%), Imipenem, Cefoperazone-Sulbactum, Gentamycin, Cefotaxime, Piperacillin-Tazobactum, Ceftazidime – 1(11.11%) each. Pseudomonas was resistant to

Cefotaxime – 4(44.44%), Levofloxacin, Ceftriaxone, Cefepime – 2(22.22%) each, Meropenem, Ceftazidime, Amoxycillin, Piperacillin-Tazobactum – 1(11.11%) each. Sensitive to Amikacin, Meropenem and resistant to Cefotaxime.Enterococcus was found in 5(1.47%) cases, was sensitive to Linezolid, Vancomycin – 4(80.00%), Levofloxacin, Ciprofloxacin – 3(60.00%), Amoxycillin-clavulanic Acid – 2(40.00%) and Teicoplanin – 1(20.00%). To summarize the Antibiogram it can be said that in the present study,Klebsiella species was sensitive to Amikacin, resistant to Cefotaxime;CONS was found to have maximum sensitivity to Linezolid, Vancomycin, Amikacin and resistant to Cefotaxime;Acinatobactor was highly sensitive to Amikacin, thenCefotaxime; E. coli was equally sensitive to Cefotaxime and Amikacin and resistant to Levofloxacin and Co-Amoxyclav;Staph aureuswas almost equally sensitive to Linezolid, Clindamycin, Vancomycin, Levofloxacin and resistant to Cefotaxime;Pseudomonas was Sensitive to Amikacin, Meropenem and resistant to Cefotaxime. So, choice of antibiotics depends on the prevailing flora in the given health care setting and their antimicrobial sensitivity.

IV. Discussion

In March 2002, the CDC launched a campaign to reduce prevalence of antibiotic resistance. In that 12-step prevention campaign, the sixth step recommends for practitioners to "use local data" by appropriately using the information presented in your institution's antibiogram.[20]

In the present study among 3313 admission, 940(28.37%) were clinical Sepsis; 620 cases were sepsis screen positive which were put on culture among which 341(55%) culture positive cases found. In a similar study by BambalaPuthattayilZakariya et al. in a Tertiary Care Hospital in South India, among 120 clinically suspected and screening positive neonatal sepsis cases 50(41.60%) showed positive culture.[8]Study conducted by ForhadMonjur et al. in an urban hospital of Bangladesh showed that among 633 neonates, blood cultures were found positive in 194 (19.4%) neonates.[9]Another study conducted by Agnihotri et al. showed similar proportion of culture positive neonatal sepsis cases (19.2%) in institution.[10] In other studies from North India and Nigeria the culture positivity rate was 13–22%.[13,16] Lower rate of bacteriologically positive sepsis (8.7%) was noted in study by Huda et at.[11] whereas higher incidences (25-54%) were seen in Uganda & some other African studies.[12, 13, 14, 15] Similar study held among admitted Georgian neonatal showed that 63% of the clinically suspected cases were blood culture positive.[21]

The etiological agents of neonatal sepsis vary between developed and developing countries.[17, 18]In present study, 57.18% growth found for Klebsiella, 11.14% CONS, 10.26% Acinatobactor,6.16% for E. coli, 5.28% for Staph aureus, 2.93% for Citrobactor, 2.64% for Pseudomonas, 1.47% each for Enterococcus, Streptococcus, Diphhtheroids.In South Indian study Klebsiellapneumoniae was commonest isolatedorganism(66%) and CONSwas the second most common (12%) isolation. Klebsiellapneumoniae was resistant to cefotaxime and most othercommonly used antibiotics except amikacin and meropenem.[8]Klebsiellapneumoniae and other Gram-negative organisms were the common causes of sepsis in the present study as well in other studies.[16, 13] In study at Bangladesh, the organisms isolated were Pseudomonas spp. (31.4%), Klebsiellapneumoniae (23.2%), Staphylococcus aureus (12.4%), Escherichia coli (7.2%), Acinatobactor (5.7%), Gram-negative Bacilli (4.1%), Flavobacterium spp. (3.6%), Serratia spp. (5.7%), Citrobacterfruendi (3.1%), Streptococcus species (2.6%), and Enterobacter spp. (1.0%). A majority of the bacterial isolates in neonatal sepsis were found sensitive to Imipenem (91.8%) and ciprofloxacin (57.2%) and resistant to commonly used antibiotics, e.g. Ampicillin (96.4%) and Cephalexin (89.2%).However, in the developed countries Group B Streptococcus and coagulasenegative staphylococci (CONS) are the predominant causes of sepsis.[19]In the North Indian study, 30–80% of the Gram negative isolates were resistant to third-generation cephalosporins.[16]This suggests that the third-generation cephalosporins cannot be used alone for empirical treatment of neonatal sepsis and amikacin which shows good activity against the gram negative bacteria should always be included in the empirical regimen. This also emphasizes the need for routine test of cephalosporin resistance.

V. Conclusion

All neonates suspected to have sepsis routinely investigated through sepsis screening at SNCU& NICU of Medical College, Kolkata. If sepsis strongly suspected,antimicrobial agentsstarted even before sepsis screening result come. Blood culture is the gold standard for diagnosis of septicemia, should be performed in all suspected cases of sepsis prior to starting antibiotic. A positive blood culture with sensitivity of the isolated organism is the guide to modify the antimicrobial agents.No single recommendation for the antibiotic regimen of neonatal sepsis for all settings is possible.Choice of antibiotics depends on the prevailing flora in the given unit and their antimicrobial sensitivity and resistance pattern.In the present study, prevailing flora were Klebsiella, CONS, Acinatobactor, E.coli. Previously empirical Cefotaxime+Amikacin used to start in all the cases but the study finding showed that Cefotaxime has high resistance. So, according to the culture sensitivity

reportPiperacillin-Tazobactum should be used. Moreover, review of antibiogram should be done in a routine interval to cope up with changing microbial pattern and drug resistance.

References

[1]. Bang AT, Bang RA, Bactule SB, Reddy HM, Deshmukh MD. Effect of home-based neonatal care and management of sepsis on neonatal mortality: field trial in rural India. Lancet. 1999;354:1955–61. [PubMed]

[2]. Stoll BJ. The global impact of neonatal infection. ClinPerinatol. 1997;24:1–21. [PubMed]

[3]. Rajaratnam JK, Marcus JR, Flaxman AD, Wang H, Levin-Rector A, Dwyer L, et al. Neonatal, post-neonatal, childhood, and under-5 mortality for 187 countries, 1970-2010: a systematic analysis of progress towards Millennium Development Goal 4. Lancet. 2010;375:1988–2008. [PubMed]

[4]. United Nations Children's Fund (UNICEF) State of the World's Newborns 2001.

[5]. Report of the National Neonatal Perinatal Database (National Neonatology Forum) 2002-03.

[6]. Singh M, Narang A, Bhakoo ON. Predictive perinatal score in the diagnosis of neonatal sepsis. J Trop Paediatr. 1994 Dec;40(6):365–81. [PubMed]

[7]. Sankar MJ, Agarwal R, Deorari AK, Paul VK. Sepsis in the newborn. Indian J Pediatr. 2008;75:261–6.

[8]. Neonatal Sepsis in a Tertiary Care Hospital in South India: Bacteriological Profile and Antibiotic Sensitivity Pattern; BambalaPuthattayilZakariya& Vishnu Bhat&BelgodeNarasimha Harish &ThirunavukkarasuArunBabu&NoyalMariya Joseph; Indian J Pediatr; DOI 10.1007/s12098-010-0314-8.

[9]. Monjur F, Rizwan F et al. Antibiotic sensitivity pattern of causative organisms of neonatal septicaemia in an urban hospital of Bangladesh. Indian J Med Sci. 2010 Jun;64(6):265-71.

[10]. Agnihotri N, Kaistha N, Gupta V. Antimicrobial susceptibility of isolates from neonatal septicemia. Jpn J Infect Dis 2004;57:273-5.

[11]. Huda HA, Gomma EE, Rajaram UU. Neonatal septicemia in Al-Jahra Hospital, Kuwait: Etiologic agents and antibiotic sensitivity patterns. Med Principles Pract 2001;10:145-50.

[12]. Klingenberg C, Olomi R, Oneko M, Sam N, Langeland N. Neonatal morbidity and Mortality in Tanzanian tertiary care referral hospital . Ann Trop Paediatr 2003;23:293-9.

[13]. Iregbu KC, Elegba OY, Babaniyi IB. Bacteriological profile of neonatal septicemia in a tertiary Hospital in Nigeria .Afr Health Sci 2006;6:151-4.

[14]. M'Zali FH, Chanawong A, Kerr KG, Birkenhead D, Hawley PM. Detection of extended-spectrum beta-lactamases in members of the family Enterobacteriaceae: Comparison of the Mast DD test, the double disc and the E-test ESBL . Antimicrob Agent Chemother 2000;45:881-5.

[15]. Mugalu J, Nakakeeto MK, Kiguli S, Kaddu-Mulindwa DH. Aetiology, risk factors and immediate outcome of bacteriologically confirmed neonatal septicaemia in Mulago hospital, Uganda. Afr Health Sci 2006;6:120-6.

[16]. Kaistha N, Mehta M, Singla N, Garg R, Chander J. Neonatal septicemia isolates and resistance patterns in a tertiary care hospital of North India. J Infect DevCtries. 2009;4:55–7.

[17]. Sanghvi KP, Tudehope DI. Neonatal bacterial sepsis in a neonatal intensive care unit: a 5 year analysis. J Paediatr Child Health. 1996;32:333–8.

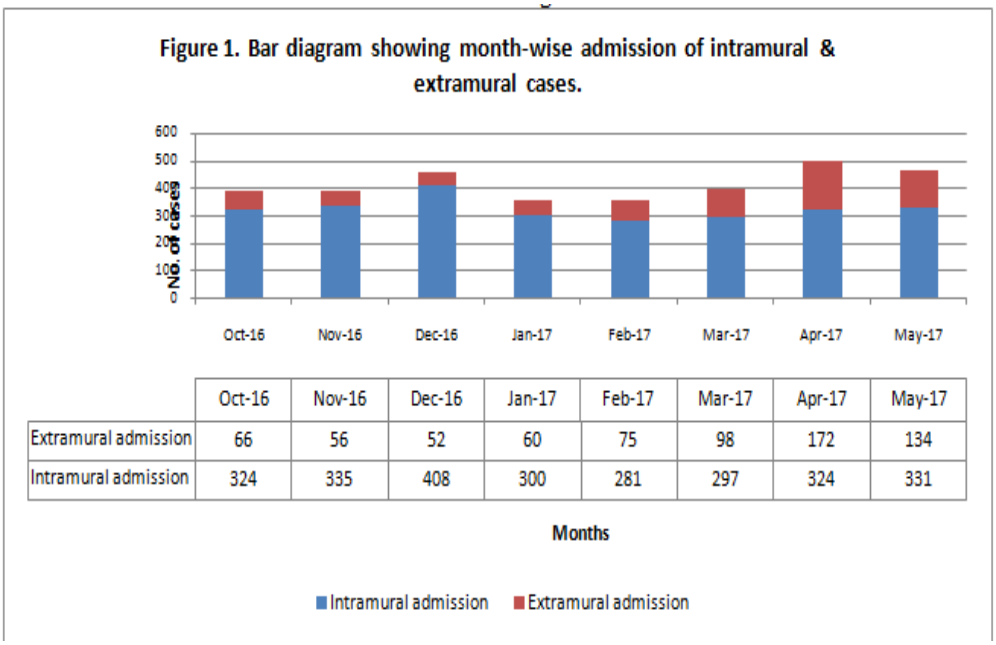
[18]. Stoll BJ, Hansen N, Fanaroff AA, et al. Changes in pathogens causing early-onset sepsis in very-low-birth-weight infants. N Engl J Med. 2002;347:240–7.

[19]. Anderson-Berry AL, Bellig LL, Ohning BL. Neonatal sepsis. [Internet]. emedicine Pediatrics: Cardiac Disease and Critical Care Medicine 2010; 978352 [Updated 2010 Feb 23; Cited 2010 Sep 22]. Available from: http://emedicine.medscape.com/ article/978352-overview.

[20]. Sameer J. Patel, Adebayo Oshodi, Lisa Saiman. Antibiotic Use in Neonatal Intensive Care Units and Adherence withCentres for Disease Control and Prevention 12 Steps Campaign to Prevent Antibiotic Resistance. The Pediatr Infect Dis J. 2009 Dec; 28(12): 1047-1051.

[21]. Macharashvli N, Leonard M K. Etiology of neonatal blood stream infections in Tbilisi, Republic of Gergia. International Journal of Infectious Diseases. July 2009; 13(4): 499-505.

Tables and Figures:



	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17
Extramural admission	66	56	52	60	75	98	172	134
Intramural admission	324	335	408	300	281	297	324	331

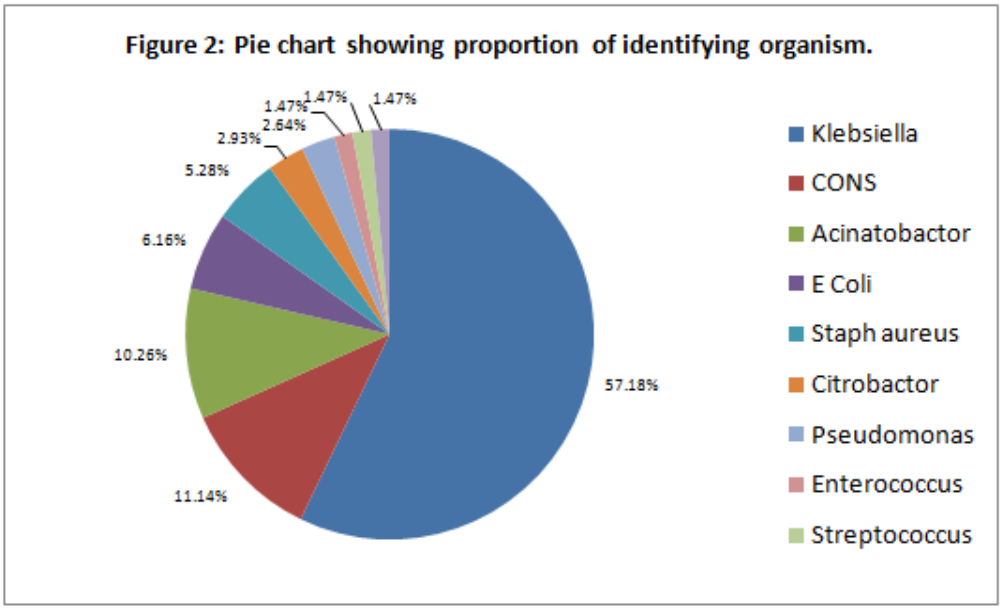


Table 1.Month-wise distribution of cases according to their birth weight.

	Month-wise admission of cases								
Birth wight (grams)	October '16	November' 16	December' 16	January'17	February'17	March'17	April'17	May'17	Total
≥2500	171(43.85)	116(29.67)	183(39.78)	210(58.33)	129(36.24)	264(66.84)	115(23.19)	170(36.56)	1358(40.99)
1500-2499	146(37.44)	228(58.31)	241(52.39)	74(20.56)	193(54.21)	106(26.84)	344(69.35)	219(47.10)	1551(46.82)
1000-1499	56(14.36)	44(11.25)	33(7.17)	66(18.33)	23(6.46)	25(6.33)	25(5.04)	65(13.98)	337(10.17)
<1000	17(4.36)	3(0.77)	3(0.65)	10(2.78)	11(3.09)	0(0.00)	12(2.42)	11(2.37)	67(2.02)
Total	390(100.00)	391(100.00)	460(100.00)	360(100.00)	356(100.00)	395(100.00)	496(100.00)	465(100.00)	3313(100.00)

Table 2. Distribution of neonates according to maturity at birth.

	Month-wise admission of cases								
Maturity at birth (Weeks of gestation)	October '16	November'16	December'16	January'17	February'17	March'17	April'17	May'17	Total
≥37	256(65.64)	283(72.38)	250(54.35)	203(56.39)	158(44.38)	301(76.20)	424(85.48)	219(47.10)	2094(63.21)
34 - 37	95(24.36)	65(16.62)	165(35.87)	84(23.33)	164(46.07)	74(18.73)	54(10.89)	173(37.20)	874(26.38)
<34	39(10.00)	43(11.00)	45(9.78)	73(20.28)	34(9.55)	20(5.06)	18(33.63)	73(15.70)	345(10.41)
Total	390(100.00)	391(100.00)	460(100.00)	360(100.00)	356(100.00)	395(100.00)	496(100.00)	465(100.00)	3313(100.00)

Table 3. Morbidity profile of all admitted cases during period of study.

	Month-wise admission of cases								
Birth wight (grams)	October '16	November' 16	December' 16	January'1 7	February' 17	March'17	April' 17	May' 17	Total
Respiratory Distress Syndrome	53(13.59)	15(3.84)	12(2.61)	12(3.33)	15(4.21)	12(3.04)	12(2.42)	11(2.37)	142(4.29)
MeconeumAspiration Syndrome	14(3.59)	32(8.18)	17(3.70)	8(2.22)	13(3.65)	11(2.78)	35(7.06)	8(1.72)	138(4.17)
Respiratory distress (other)	32(8.21)	31(7.93)	27(5.87)	24(6.67)	31(8.71)	40(10.13)	30(6.05)	22(4.73)	237(7.15)
Birth Asphyxia	74(18.97)	43(11.00)	31(6.74)	40(11.11)	25(7.02)	106(26.84)	67(13.51)	83(17.85)	469(14.16)
Sepsis	60(15.38)	106(27.11)	195(42.39)	104(28.89)	94(26.40)	123(31.14)	149(30.04)	109(23.44)	940(28.37)
Congenital Malformation	4(1.03)	0(0.00)	2(0.43)	1(0.28)	4(1.12)	6(1.52)	4(0.81)	8(1.72)	29(0.88)
Neonatal Hyperbillirubinemia	75(19.23)	96(24.55)	94(20.43)	64(17.78)	78(21.91)	61(15.44)	80(16.13)	124(26.67)	672(20.28)
Hypothermia	21(5.38)	31(7.93)	19(4.13)	24(6.67)	57(16.01)	16(4.05)	27(5.44)	40(8.60)	235(7.09)
Hypoglycaemia	14(3.59)	6(1.53)	51(11.09)	49(13.61)	34(9.55)	20(5.06)	33(6.65)	32(6.88)	239(7.21)
Prematurity	43(11.03)	31(7.93)	12(2.61)	34(9.44)	5(1.40)	0(0.00)	59(11.90)	28(6.02)	212(6.40)
Total	390(100.00)	391(100.00)	460(100.00)	360(100.00)	356(100.00)	395(100.00)	496(100.00)	465(100.00)	3313(100.00)

Table 4. Cause-specific mortality of neonates under study.

	Month-wise mortality								
	October '16	November' 16	December' 16	January' 17	February' 17	March'17	April'17	May'17	Total
Respiratory Distress Syndrome	5(7.94)	4(6.78)	3(7.32)	6(21.43)	3(5.26)	5(6.94)	9(18.37)	5(9.62)	40(9.50)
Meconeum Aspiration Syndrome	0(0.00)	6(10.17)	2(4.88)	1(3.57)	2(3.51)	0(0.00)	4(8.16)	0(0.00)	15(3.56)
Sepsis	18(28.57)	14(23.73)	11(26.83)	9(32.14)	12(21.05)	30(41.67)	8(16.33)	10(19.23)	112(26.60)
Birth Asphyxia	20(31.75)	9(15.25)	13(31.71)	5(17.86)	14(24.56)	15(20.83)	9(18.37)	10(19.23)	95(22.57)
Congenital Malformation	5(7.94)	1(1.69)	3(7.32)	3(10.71)	8(14.04)	5(6.94)	4(8.16)	8(15.38)	37(8.79)
Prematurity	11(17.46	23(38.98)	9(21.95)	2(7.14)	18(31.58)	17(23.61	15(30.16	17(32.69)	112(26.60

	)					)	)		)
others	4(6.35)	2(3.39)	--	2(7.14)	--		--	2(3.85)	10(2.38)
Total	63(100.00)	59(100.00)	41(100.00)	28(100.00)	57(100.00)	72(100.00)	49(100.00)	52(100..00)	421(100.00)

*Dr. Dibyendu Raychaudhuri. "Neonatal Sepsis:Magnitude, Antibiogram And Outcome in A Tertiary Care Hospitalof Kolkata." IOSR Journal of Dental and Medical Sciences (IOSR-JDMS) , vol. 16, no. 10, 2017, pp. 42–49.