ORIGINAL RESEARCH PAPER

Volume-7 | Issue-8 | August-2018 | PRINT ISSN No 2277 - 8179

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

NEONATAL SEPSIS : AN AUDIT OF DEMOGRAPHIC AND PREDISPOSING FACTORS

Paediatrics

Sanjay Choudhary Senior Specialist,Department of Paediatrics, Baba Saheb Ambedkar Medical College ,Delhi

Neeru Malik* CMO(NFSG), Department of Obstetrics and Gynaecology,Baba Saheb Ambedkar Medical College, Delhi *Corresponding Author

Pawan Verma ex-DNB student, Department of Paediatrics Baba Saheb Ambedkar Medical College ,Delhi

Neelu Madan Senior Medical Officer, Obstetrics and Gynaecology,WUS Health Centre ,Delhi University

ABSTRACT

Background Neonatal sepsis is a leading cause of neonatal morbidity and mortality in India.The aim of this study was to identify predisposing factors for neonatal sepsis so as steps can be taken to minimize the same.

Material and Methods This was an Observational cross-sectional descriptive study conducted on 250 neonates brought to the out born nursery of Dr. Baba Saheb Ambedkar Hospital, with clinical features of sepsis. A detailed history including chief complaints, risk factors, past and family history, obstetric history and treatment details were recorded. Data was analysed using SPSS Statistical Software Version 15.0.

Result In the present study on outborn neonates admitted with sepsis 74.2% had late onset sepsis. 49.6% of cases of neonatal sepsis had low birth weight and 36.8% were premature. Dai handling before delivery was present in 47.2% of the mothers of neonates in our study group. PROM was present in only 6.5% of cases and maternal fever and meconium stained liquor in 12.8% and 17.6% respectively.

ConclusionThere was a 1.55 times higher incidence of sepsis in males as compared to females. Neonatal sepsis was strongly associated with low birth weight and prematurity. Dai handling before delivery was the single most important factor responsible for sepsis in outborn new borns. Pregnant women should be encouraged for regular antenatal check ups and institutional deliveries.

KEYWORDS

Neonatal Sepsis, Neonatal Mortality,neonatal Morbidity

INTRODUCTION

Neonatal morbidity and mortality remains very high in the developing countries of Asia, sub-Saharan Africa and Latin America.[1] India contributes to one-fifth of global live births and more than a quarter of neonatal deaths. Nearly, 0.75 million neonates died in India in 2013, the highest for any country in the world.[2] Three causes accounted for 78% all neonatal deaths in India: prematurity, neonatal infections and birth asphyxia.[3] Neonatal bacterial infections are an important cause of morbidity and mortality among infants admitted to neonatal intensive care units (NICUs).[7] Sepsis is normally defined as bacteraemia in combination with systemic inflammatory response syndrome, but there is no widely accepted definition for neonatal sepsis.[4] since blood culture has a low sensitivity in neonatal sepsis[5], many studies also include infants with clinical signs of sepsis but a negative blood culture. This condition is normally referred to as clinical, probable or suspected sepsis[6], but has not been sufficiently defined. Neonates may acquire infections inutero (transplacental and ascending), intrapartum, or postnatally.Signs and symptoms of infection in neonates are subtle and non-specific. The interpretation of clinical symptoms of sepsis in the newborn may be difficult during the first 48 hours after birth, since these symptoms may be caused by other clinical problems, such as birth asphyxia, respiratory distress syndrome, or metabolic diseases. Depending on the onset age of the disease, neonatal sepsis is divided into early neonatal sepsis or late onset sepsis. Early neonatal sepsis (EOS) is mainly due to organisms acquired before and during delivery (or maternal fetal infection),clinical manifestations cccur within three days of birth, where as late onset sepsis (LOS) is due to organisms acquired after delivery from the environment (nosocomial or community sources) .It presents after three days of birth.

It has been estimated that timely identification and management of serious infections can reduce 20 to 55% of neonatal deaths with 90% service coverage, and further reduction can be achieved in conjunction with additional antenatal and intrapartum care . Data on burden and risk factors of community-acquired neonatal infections in developing countries are scant but are critically essential for designing and implementing targeted interventions in such settings [9] Hence this study was undertaken to find the demographic profile and predisposing factors for neonatal sepsis in cases admitted to the outborn nursery.

MATERIALAND METHODS

This was an Observational cross-sectional descriptive study conducted on out born neonates brought to the out born nursery of Dr. Baba Saheb Ambedkar Hospital, with clinical features and risk factors suggestive of sepsis. 250 outborn neonates were enrolled in the present study from January 2012 to December 2014.

Inclusion criteria:

Out born neonates presenting with any two or more of the following signs and symptoms were included into study:

1. Hypothermia(<950c) or fever(>990c)
2. Lethargy, poor cry, refusal to suck
3. Hypoglycaemia (<40mg/dl)/ Hyperglycaemia (>125mg/dl)
4. Poor perfusion, prolonged capillary refill time
5. Hypotonia, absent neonatal reflexes
6. Bradycardia (<100/min)/ tachycardia (>160/min)
7. Respiratory distress, apnoea and gasping respiration
8. Bulging anterior fontanel, vacant stare, high-pitched cry, excess irritability, stupor/coma, seizures, neck retraction
9. Feed intolerance, vomiting, diarrhoea, abdominal distension
10. Bleeding , petichae , purpura
11. Multiple pustules (>10), abscess, sclerema, mottling, umbilical redness and discharge.

Exclusion criteria

1. Neonate with obvious congenital malformation.
2. Neonate born to HIV positive mother.
3. Neonate who have received antibiotics(oral/intravenous).
4. Neonate with history of birth asphyxia/perinatal asphyxia (APGAR score <5 at 1 min).
5. Neonates born with lab confirmed perinatal TORCH infection.

The neonates enrolled into the study were classified into three categories as follows:

1. No sepsis

An out born neonate presenting with clinical features and risk factors suggestive of sepsis but Septic screen and blood culture were negative.

2. Probable sepsis

An out born neonate presenting with clinical features and risk factors suggestive of sepsis .Septic screen was positive and blood culture was negative.

3. Definitive sepsis

An out born neonate presenting with clinical features and risk factors suggestive of sepsis and both Septic screen and blood culture were positive.

At presentation to the Paediatric Emergency Department, the neonates were assessed and emergency resuscitative measures were given which included airway management, suctioning of ample secretions, intravenous fluid bolus, oxygen, warmer care as required .Other necessary treatment and stabilisation of vital parameters were executed and appropriate treatment was given as per the NICU management protocol. Following this, a questionnaire was completed. This questionnaire had details of the neonate and his/her parents. A detailed history including chief complaints, risk factors, past and family history obstetric history and treatment details were taken.

The statistical significance of categorical variable between No sepsis, Probable sepsis and definitive sepsis groups was determined by Chi-square or Fischer-Exact test. While the quantitative variables between the groups were analysed by using ANOVA or Krusal-Wallis test. The level of statistical significance was taken as P value < 0.05The data was analysed by using SPSS Statistical Software Version 15.0.

OBSERVATION AND RESULTS

In this study conducted from January 2012 onwards, 250 neonates fulfilling the inclusion criteria were enrolled and admitted in NICU of Dr. Baba Saheb Ambedkar Hospital, Delhi.

Table 1: Frequency Of Gender Distribution In Sepsis

GENDER	SEPSIS			TOTAL N(%)
	NO N(%)	PROBABLE N(%)	DEFINITIVE N(%)	
MALE	32 (61.5)	80(61.5)	40(58.8)	152(60.8)
FEMALE	20(38.5)	50(38.5)	28(41.2)	98(39.2)
TOTAL	52(100)	130(100)	68(100)	250(100)

Out of the 250 neonates admitted, 152(60.8%) were male and 98(39.2%) were female. Although male sex was predominant in sepsis with the ratio of male: female being 1.55: 1.

Table 2: Sepsis In Preterm And Term Neonates

SEPSIS	PRETERM	TERM
NO	14(26.9%)	38(73.1%)
PROBABLE	50(38.5%)	80(41.5%)
DEFINITIVE	28(41.5%)	40(58.8%)

There were 92 (36.8%) preterm and 158 (63.2%) term neonates .

Table 3 : Distribution Of Sepsis In Lbw Neonates

SEPSIS	LOW BIRTH WEIGHT	
	NO	YES
NONE	30(57.7%)	22(42.3%)
PROBABLE	62(47.7%)	68(52.3%)
DEFINITIVE	34(50.0%)	34(50.0%)

Because the birth weight was not known for many of the out born neonates, weight at presentation was taken to make uniformity in data collection.

Table Iv: Distribution Of Neonate With Eos And Los

ONSET	SEPSIS			TOTAL (N%)
	NO (N%)	PROBABLE (N%)	DEFINITIVE (N%)	
EOS	8 (15.4)	36(27.7)	20(29.4)	64(25.6)
LOS	44(84.6)	94(72.3)	48(70.6)	186(74.4)
TOTAL	54(100)	130(100)	68(100)	250(100)

According to the age of onset of infection, neonates were classified as EOS (≤ 3 days) and LOS (>3 days). There were 64(25.6%) neonates admitted as EOS and 186(74.4%) admitted as LOS.

Table V: Relationship Between Various Risk Factors And Sepsis

RISK FACTORS	SEPSIS				P value
	NONE (n=52)	PROBABLE (n=130)	DEFINITIVE (n=68)	TOTAL (n=250)	
PROM	2(3.8%)	4(3.1%)	10(14.7%)	16(6.5%)	0.071
PPROM	2(3.8%)	10(7.7%)	0(0%)	12(4.8%)	0.228
Maternal fever	4(7.7%)	16 (12.3%)	12(17.6%)	32(12.8%)	0.512
Meconium stained liquor	8(15.4%)	20(15.4%)	16(23.5%)	44(17.6%)	0.568
Multiple obstetric procedure	6(11.5%)	8 (6.2%)	2(2.9%)	16(6.4%)	0.400
Dai handling before delivery	24(46.2%)	60(46.2%)	34(50%)	118(47.2%)	0.929
Unexplained perinatalasphyxia	0 (0%)	2(1.5%)	0 (0%)	2(8%)	0.628
Prolonged hospitalisation	0 (0%)	2 (1.5%)	0 (0%)	2(8%)	0.628
LBW	22(42.3%)	68(52.3%)	64(50%)	124(49.6%)	0.689
Prematurity	14(26.9%)	50(38.5%)	28(41.2%)	92(36.8%)	0.485
Invasive procedure	0 (0%)	0 (0%)	0 (0%)	0(0%)	
Poor feeding	8 (15.4%)	42(32.3%)	12 (17.6%)	62(24.8%)	0.127
Poor hygiene	22(42.3%)	38(29.2%)	26(38.2%)	46(34.4%)	0.425
Poor cord care	2 (3.8%)	12(9.2%)	12(17.6%)	26(10.4%)	0.201
Over crowding	4 (7.7%)	12(9.2%)	6 (8.8%)	22(8.8%)	0.973

PROM and PPROM was present in 16(6.5%) and 12(4.8%) of mothers of babies in study group.

Maternal fever and meconium stained liquor was present in 32(12.8%) and 44(17.6%) of mother of babies in study group

Dai handling before delivery was present in 118(47.2%) of the mothers of babies in study group.

Poor feeding and overcrowding were present in 62(24.8%) and 22(8.8%) of neonate admitted respectively.

Poor hygiene and poor cord care was present in 86(34.4%) and 26 (10.4%) of neonate respectively.

DISCUSSION

Neonatal sepsis is one of the leading causes of morbidity and mortality. In the present study carried out in department of paediatrics Dr. Baba Saheb Ambedkar Hospital, Delhi 250 out born neonates were studied and evaluated for sepsis.

Of the total 250 neonates in this study, 152(60.8%) were male and 98(39.2%) were females. The ratio of male: female was 1.55: 1. The male gender is considered as a risk factor for development of early onset sepsis (Yancy MK et al 1996)[10]. The factor regulating the synthesis of gamma globulins are probably situated on the X-chromosome in the male infants thus confers less immunological protection compared to the female counterpart. Upadhyay et al [11] have reported the ratio of male:female was1.4 : 1.38 and Bhat YR et al [12] have reported 1.36 fold higher incidence of EOS in male than female suggesting the possibility of sex linked factor in host susceptibility. Our study is in accordance with the above statement.Males have been reported to be 2 to 5 times more than females to develop neonatal sepsis. This may be due to a gender bias in presentation to hospital for care because most of the parents are more concerned about male child.[13]

In this study, LBW was observed in 49.6% of neonates with sepsis. Khinchi Y R et al [14] reported that sepsis was more common in outborn group (59%) as compared to inborn (35%) and inversely proportional to birth weight i.e. 65% in low birth weight (≥2.5).

In our study, 64(25.6%) neonates had early onset sepsis and 186(74.4%) had late onset sepsis; this is contrast to Upadhyay et al, [11] in which EOS was 41.8% of all NNS while rest of 58.2% was LOS. The data from NNPD 2002-2003 showed that majority of NNS were EOS (56.1%) and LOS being (45.3%). [15] This could be explained by the fact that we conducted our study in out born babies only (not delivered in our hospital) who were brought to medical attention when 2 to 3 days had already elapsed. Among 64(25.6%) neonates of EOS 20(31.2%) had culture proven definitive sepsis, 36(56.2%) had probable sepsis and 8(12.6%) had no sepsis. Among 186(74.4%) neonates of LOS 48(25.8%) had culture proven definitive sepsis and 94(50.5%) had probable sepsis and 44(23.7%) had no sepsis.

In this study the numbers of EOS were 64 cases, out of which there were 8(12.5%) cases of PROM and out of total 186 cases of LOS, there were 8(4.3%) cases of PROM. These results were against the study

conducted by Joshi B et al [16] who concluded that 25.9% of cases of sepsis were associated with PROM. However, results of study conducted by Tallur SS et al (10.3%) [17] and Kuruvilla A et al. (13.3%) [18] who reported relatively lower incidence of PROM associated with sepsis, were similar to our study.Herbst et al [19] reported that the risk of neonatal sepsis increases with duration of membrane rupture in a linear fashion during the first 36 hours, independently of labor duration. Gebremedhin D et al [20] found PROM and maternal fever in 30.8% and 28.2% cases of neonatal sepsis as compared to 6.5% and 12.8% in our study.

There were 44(17.6%) cases associated with meconium stained liquor in this study. Our data is comparable to Mathai E et al [21] who reported meconium stained liquor in 20% in their study group. However, Kuruvilla A et al [18] in their study concluded a total of 30% cases were meconium stained liquor respectively which is not corroborated in our study.

CONCLUSION

There was a 1.55 times higher incidence of sepsis in males as compared to females. Neonatal sepsis was strongly associated with low bith weight and prematurity. A higher incidence of late onset sepsis was noted in our study probably because cases included in study were from the community. Dai handling before delivery was the single most important factor responsible for sepsis in outborn new borns. Proper Antenatal care, maternal nutrition and incentivization of pregnant women for institutional deliveries through schemes like JSY and JSSK are positive steps in prevention of neonatal sepsis in the community.

References

1. World Health Organisation. World Health Report. Newborn death and illness : Geneva; 2011. http:// www. who.int /pmnch/ media/press materials/ fs/fs newborndealth_ illness/en/
2. Liu L, Oza S, Hogan D, Perin J, Rudan I, Lawn JE et al. Global, regional, and national causes of child mortality in 2000–13, with projections to inform post-2015 priorities: an updated systematic analysis. Lancet 2015; 385(9966): 430–440.
3. Bassani DG, Kumar R, Awasthi S, Morris SK, Paul VK, Shet A et al. Causes of neonatal and child mortality in India: a nationally representative mortality survey. Lancet 2010; 376: 1853–1860.
4. Haque KN. Definitions of bloodstream infections in the newborn. Pediatr Crit Care Med. 2005; 6(3 suppl): S45-49.
5. Kellogg JA, Ferrentino FL, Goodstein MH, Liss J, Shapiro SL, Bankert DA. Frequency of low level bacteremia in infants from birth to two months of age. Pediatr Infect Dis J. 1997; 16(4): 381-385.
6. Mehr S, Doyle LW. Cytokines as markers of bacterial sepsis in newborn infants: a review, Pediatr Infect Dis J. 2000; 19 (9): 879.
7. Reier-Nilsen T, Farstad T, Nakstad B, Lauvrak V, Steinbakk M. Comparison of broad range 16 S rDNA PCR and conventional blood culture for diagnosis of sepsis in the newborn: a case control study. BMC, Pediatr, 2009; 9:5.
8. Edmond K, Zaidi A. New Approaches to Preventing, Diagnosing, and Treating Neonatal Sepsis. PLOS Med.2010; 7 (3): e1000213 doi: 10.1371/journal.pmed.1000213 [PMC free article] [PubMed]
9. Oldu MA, Guta MB, Lenjisa JL, Tegegne GT, Tesafye G, Dinsa H. Assessment of the incidence of neonatal sepsis, its risk factors, antimicrobial use and clinical outcomes in Bishoftu General Hospital, Neonatal Intensive Care Unit, Debrezeit-Ethiopia. Pediat Therapeut.2014. August; 4: 214 doi: 10.4172/2161-0665.1000214
10. Yancey MK, Duff P, Kubilis P, Clark P,Frentzen H. Risk factors for neonatal sepsis. Obst&Gynecol 1996; 2:188-194.
11. Upadhya A, Aggarwal R, Kapil A, Singh S et al: Profile of neonatal sepsis in a tertiary care neonatal unit. Indian Journal of Neonatology 2006; 20(1): 50-57.
12. Bhat YR, Lincy PB. Early Onset of Neonatal Sepsis: Analysis of the risk factors and the bacterial isolates by using the BacT Alert system. Journal of Clinical and Diagnostic Research.2011; 5(7):1385-1388.
13. Shah MN, Desai PB. Clinical and bacteriological profiles of blood culture positive sepsis in newborns. Int. J. of Pharm. & Life Sci. 2011;2(9): 1041-1045.
14. Khinchi Y R, Kumar Anit, Yadav Satish. Profile of neonatal sepsis. Journal of college of Medical Sciences-Nepal 2010;6(2): 1-6.
15. Report of National Neonatal Perinatal Database- Newborn baby. (National Neonatology Forum) 2002-2003. www.newbornwhocc.org/pdf/HRRC-Report_2002-03.pdf
16. Joshi SG, Ghole VS, Niphadkar KB: Neonatal Gram Negative Bacteremia, Indian J Pediatr.2000; 67(1):27-32.
17. Tallur SS, Kasturi AV, Nadgir D and Krishna VS: Clinico-Bacteriological study of Neonatal Septicemia, Indian J Pediatr.2000;67(3):169-174.
18. Kuruvilla A, Pillai S, Jesudason M, Jha A K: Bacterial profile of sepsis in a neonatal unit in south India, Indian paediatrics. 1998; 35:851-858.
19. Herbst A, Källén K.Time between membrane rupture and delivery and septicemia in term neonates.Obstet Gynecol. 2007 Sep; 110(3):612-8.
20. Gebremedhin D, Berhe H, Gebrekirstos K. Risk Factors for Neonatal Sepsis in Public Hospitals of Mekelle City, North Ethiopia, 2015: Unmatched Case Control Study. PLoS One. 2016; 11(5):e0154798. Epub 2016 May 10.
21. Mathai E. Christopher U, Mathai M, Jana AK, Rose D, Bergstrom S: Is CRP level useful in differentiating infected from uninfected neonates among those at risk of infection? Indian Pediatrics; 2004:41(9)895-900.