Original Research Article

Maternal Risk Factors associated with Neonatal Sepsis-A Cross Sectional Study

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Abstract

Introduction: Neonatal sepsis can be defined as a clinical condition which is characterized by signs and symptoms of infection in an infant 28 days of life or younger. This is manifested by systemic signs of infection and/ or isolation of a bacterial or other pathogen from the bloodstream. Sepsis is still one of the major causes of morbidity and mortality globally in neonates, despite of recent advances in healthcare units. The incidence of neonatal sepsis by bacteremia in asymptomatic infants is low. In neonatal sepsis we can include septicemia, pneumonia, meningitis, osteomyelitis, and arthritis and urinary tract infections. The burden for neonatal sepsis was 2,202 (95% CI: 1,099–4,360) per 100,000 live births, with mortality between 11% and 19% and more than 40% of under-five deaths occur in the neonatal period, resulting in 3.1 million new-born deaths each year globally.**Material and methods**: The total number neonates admitted in the hospital in given study period was 447, of which 198 were diagnosed for neonatal sepsis by the physician based on the signs and symptoms during admission. The data was collected in three parts: sociodemographic characteristics; maternal information; and part neonatal information for neonatal sepsis. Data was collected in the excel sheet and questionnaires were reviewed and organized by investigators.**Results**: Of the 198 neonates, 162 (81.8%) infants were in the age range of 0 to 7 days while 36 (18.2%) were aged between 8 and 28 days. Statistically significant difference was observed between early onset and late onset sepsis patients. Out of 198 cases 107 (54%) were male while 91(46%) were female. In early onset sepsis cases maternal UTI, Meconium stained amniotic fluid, Multipara and Premature rupture of membrane was seen in 24(14.8%), 21(13.0%), 19(11.7%) and 32 (19.8%) cases respectively. In late onset sepsis cases maternal UTI, Meconium stained amniotic fluid, Multipara and Premature rupture of membrane was seen in 1(2.8%), 2 (5.6%), 4(11.1%) and 2 (5.6%) cases respectively. Maternal risk factors were identified in 104(64.2%) of early onset sepsis cases while maternal risk factors in late onset sepsis cases were 10(27.8%). Culture positivity was observed in 28 (17.3%) cases of early neonatal sepsis while it was 4 (11.1%) in late onset sepsis.**Conclusion**: There was male preponderance in early as well as late onset neonatal sepsis. Maternal risk identification may help in the early identification and timely empirical antibiotic therapy. The prediction and/ or diagnosis of neonatal sepsis should be bases on culture-independent diagnostics and risk factor-based scoring systems.

Keywords: Neonatal,sepsis,antibiotic,therapy

Introduction

Among term and preterm infants neonatal sepsis is one of the leading causes of morbidity and mortality[1]. Also it contributes significantly to mortality and morbidity among very-low-birth-weight (VLBW, weight less than1500 gm) infants in Neonatal Intensive Care Units (NICU)[2]. Mortality in the neonatal period each year account for 41% (3.6 million) of all deaths in children under 5 years and most of these deaths occur in low income countries and about one million of these deaths are attributable to infectious causes including neonatal sepsis, meningitis, and pneumonia [3]. Neonatal sepsis can be defined as a clinical condition which is characterized by signs and symptoms of infection in an infant 28 days of life or younger. This is manifested by systemic signs of infection and/ or isolation of a bacterial or other pathogen from the bloodstream[4].Sepsis is still one of the major causes of morbidity and mortality globally in neonates, despite of recent advances in healthcare units. The burden for neonatal sepsis was 2,202 (95% CI: 1,099–4,360) per 100,000 live births, with mortality between 11% and 19% and more than 40% of under-five deaths occur in the neonatal

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period, resulting in 3.1 million new-born deaths each year globally[5,6]. In neonatal sepsis we can include septicemia, pneumonia, meningitis, osteomyelitis, arthritis and urinary tract infections[7]. Clinical features are generally non-specific and are inefficient for identifying neonates with early-onset sepsis (EOS)[8]. The incidence of neonatal sepsis by bacteremia in asymptomatic infants is low[9]. Full term infants are more likely to react to a bacterial infection with fever while preterm newborns were more likely to react with hypothermia, because of transitional difficulty with temperature control especially in the first two days[10,11]. Respiratory distress with tachypnea, nasal flaring, grunting and retraction of respiratory muscles can be the manifestation of sepsis with or without pneumonia and this can be confused with transient tachypnea of newborn initially. Neonatal sepsis can be complicated by metastatic foci of infection, disseminated intravascular coagulation, congestive heart failure and shock[12]. Based on the timing of the infection neonatal sepsis has been classified into early-onset sepsis (EOS) and late-onset sepsis (LOS)[13]

Material and methods

The present study was conducted at Ananta Institute of Medical Sciences and Research Centre Rajsamand, Rajasthan. This study was carried out using institution based cross section study in the department of pediatrics. The total number neonates admitted in the hospital in given study period was 447, of which 198 were diagnosed for neonatal sepsis by the physician based on the signs and symptoms during admission. The data was collected in three parts: sociodemographic characteristics; maternal information; and part neonatal information for neonatal sepsis. Data was collected in the excel sheet and questionnaires were reviewed and organized by investigators. The data were entered after defining variables and analyzed using SPSS v. 20.0 statistical software. Statistical significance was shown if p value less than 0.05 for multivariable and 0.25 for bivariate logistic regressions. Finally, the result is presented using tables and texts.

Results

Among 447 neonates admitted 198 (44.3%) were diagnosed for neonatal sepsis by the physician based on the signs and symptoms during admission. Of the 198 neonates, 162 (81.8%) infants were in the age range of 0 to 7 days while 36 (18.2%) were aged between 8 and 28 days. Statistically significant difference was observed between early onset and late onset sepsis patients.

Table 1: Onset of neonatal sepsis

Age	Number [% (n=198)]	P value
0 to 7 days	162(81.8%)	P < 0.0001
8 to 28 days	36(18.2%)	
Total	198	

Table 2: Male to female ratio

Gender	Early onset sepsis	late onset sepsis	Total
Male	86(80.4%)	21(19.6%)	107
Female	76(83.6%)	15(16.4%)	91
Total	162(81.8%)	36(18.2%)	198

Out of 198 cases 107 (54%) were male while 91(46%) were female. Of the 107 males 86(80.4%) were of early onset sepsis while 21(19.6%) were late onset sepsis. Of the 91 females 76(83.6%) were early onset sepsis while 15(16.4%) were diagnosed as late onset sepsis.

Table 3: Maternal risk factors

Risk factors	Early onset sepsis (n= 162)	%	Late onset sepsis (n=36)	%
Foul smelling liquor	**8**	**4.9%**	**1**	**2.8%**
Maternal UTI	24	14.8%	1	2.8%
Meconium stained amniotic fluid	**21**	**13.0%**	**2**	**5.6%**
Multipara	19	11.7%	4	11.1%
Premature rupture of membrane	**32**	**19.8%**	**2**	**5.6%**
Total	104	64.2%	10	27.8%

UTI: Urinary tract infection

Maternal risk factors were identified in 104(64.2%) of early onset sepsis cases while maternal risk factors in late onset sepsis cases were 10(27.8%). Maternal risk factor foul smelling liquor in early onset sepsis and in late onset sepsis was 8 (4.9%) and 1 (2.8%) respectively. In early onset sepsis cases maternal UTI, Meconium stained amniotic fluid, Multipara and Premature

rupture of membrane was seen in 24(14.8%), 21(13.0%), 19(11.7%) and 32 (19.8%) cases respectively. In late onset sepsis cases maternal UTI, Meconium stained amniotic fluid, Multipara and Premature rupture of membrane was seen in 1(2.8%), 2(5.6%), 4(11.1%) and 2 (5.6%) cases respectively.

Table 4: Culture positive cases

Type	Culture positive	Percentage
Early onset sepsis	28	17.3%
Late onset sepsis	4	11.1%

Culture positivity was seen in 28 (17.3%) cases of early neonatal sepsis while it was 4 (11.1%) in late onset sepsis.

Discussion

Globally, there are three million annual neonatal sepsis cases (2202/ 1,00,000 live births) while India has the highest incidence of clinical sepsis (17,000/ 1,00,000 live births). The case fatality rate of sepsis among neonates is between 25% to 65% in India[15]. The application of a risk-factor based approach for guidance of the management decisions has been debated with relation to its cost-effectiveness. It has, however, been shown to be one of the highly effective approaches for reducing neonatal early-onset sepsis (EOS)-based mortality in High Income Countries. So it is adviced in resource-limited settings with a high neonatal mortality rate, such as in India, a combination of risk factors and clinical signs should guide the intrapartum and neonatal management[16]..In our study maternal risk factors were identified in 104(64.2%) of early onset sepsis cases while maternal risk factors in late onset sepsis cases were 10(27.8%). In studies it was evident that the maternal risk factors are important in early onset sepsis particularly of Group B Streptococcal aetiology[17]. Such evidence can help to design risk-factor based eligibility criteria for intervention studies on neonatal sepsis [18]. Also it has been suggested that maternal factors such as premature delivery and premature rupture of membrane have also been implicated as significant risk factors in a meta-analysis on neonatal early onset sepsis[14].In our study 107 (54%) were male while 91(46%) were female. Of the 107 males 86(80.4%) were of early onset sepsis while 21(19.6%) were late onset sepsis. Of the 91 females 76(83.6%) were early onset sepsis while 15(16.4%) were diagnosed as late onset sepsis. Higher incidences of sepsis in male were shown in other studies possibly based on the male disadvantage hypothesis[19,20]. It was found that 28 (17.3%) cases of early neonatal sepsis while it was 4 (11.1%) in late onset sepsis were culture positive. In other studies culture positive cases ranges from 25% to 45%[20]. But the disadvantage of culture is it takes around 48 hours to give the positive report and has risk of false-positive or low-yield results after antenatal antibiotic exposure[21].

Conclusion

There was male preponderance in early as well as late onset neonatal sepsis. Maternal risk identification may help in the early identification and timely empirical antibiotic therapy so that mortality and morbidity can be reduced. The prediction and/ or diagnosis of neonatal sepsis should be bases on culture- independent diagnostics and risk factor-based scoring systems.

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