Original Article

The Risk Factors and Management of Neonatal Sepsis in A Tertiary Care Hospital in Bangladesh

Azam MG[1], Sufian A[2], Mahmud A[3], Majumder S[4], Parveen N[5], Rana J[6], Amin R[7]

Abstract

Background: *Despite significant attempts to mitigate its effects, still now in Bangladesh neonatal sepsis is regarded as a major cause of morbidity and mortality in newborns. The main goal of this study is to evaluate the risk factors and management of neonatal sepsis in a tertiary care hospital in Bangladesh.* ***Materials & Methods:*** *This cross-sectional study was carried out in Brahmanbaria medical college hospital, Brahmanbaria with ethical clearance from respective IERB. Hundreds (100) neonates with suspected neonatal sepsis who were admitted in the neonatal unit were included in this study. Clinical sepsis was diagnosed based on the presence of one or more of the following features: fever (≥38.0°C), hypothermia (≤36.5°C), convulsions, lethargy, poor feeding, respiratory distress, vomiting, bulging fontanels, jaundice and umbilical pus infections.* ***Results:*** *In this study 45 cases belong to 15-21 days and majority (60%) cases were female. While evaluating the hygiene status, 80 cases undergone poor hygiene status, followed by 70 cases had formula feeding and 40 cases had the history of prolonged labour, 35 cases had history of perinatal asphyxia. Extremely low birth weight occurred in 20% of cases, and low birth weight occurred in 40% of cases. Respiratory distress was seen in 70 cases followed by fever in 60 cases, hypothermia in 20 cases, convulsion in 20 cases, skin rash in 25 cases and jaundice in 20 cases. Most common organism was Streptococcus agalactia (40%) where 60% got their antibiotic treatment for 5-7 days. 60% of cases were discharged with advice. The mortality rate was only 20% in this study.* ***Conclusion:*** *In this study lethargy, respiratory distress and fever are typical clinical characteristics of newborn sepsis. Home delivery cases were found to be significant percentage along with prelacteal and formula feeding. Besides that, streptococcus agalactiae was found as a major isolated organism for progression of neonatal sepsis. This study emphasizes that advances in newborn intensive care medicine can be applied to increase sepsis survival.*

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Introduction

Neonatal infections are the most common cause of neonatal mortality along with perinatal asphyxia and consequence of prematurity & low birth weight (LBW) in Bangladesh[1]. Mortality related to neonatal sepsis is more common in developing countries compared with developed countries[2]. According to the age of onset, neonatal sepsis is classified into two as early-onset sepsis (EOS) or late-onset sepsis (LOS)[1-4].

Early-onset sepsis (EOS) occurs within the first 72 hours of life, while late-onset sepsis (LOS) occurs beyond the first 72 hours up to 28 days[5-10]. EOS is caused by transplacental or, more commonly, ascending infections from the maternal vaginal canal, whereas the community or postnatal nosocomial environment is the cause of LOS, with a peak incidence observed between the 10th and 22nd day of life[11]. Prematurity (38%), neonatal infection (31%) and congenital malformations (16%) are the leading causes of neonatal malformations (NM)[12,13]. Neonatal sepsis is the single most common cause of neonatal deaths in hospitals as well as communities in developing country[14]. The objectives of this study are to evaluate the risk factors, management and laboratory profile of early onset neonatal sepsis in a tertiary care hospital in Bangladesh.

Materials and Methods

This cross-sectional study was carried out in the neonatology department in Brahmanbaria Medical College, Brahmanbaria for one year from January to December 2017 with ethical approval taken from the Institutional Ethical Review Board (IERB) of Brahmanbaria Medical College. The study population was 100 neonates with sepsis during the

[1]Md. Golam Azam, Assistant Professor, Dept. of Paediatrics, Brahmanbaria Medical College & Hospital, Brahmanbaria, Bangladesh.
[2]Abu Sufian, Assistant Professor, Department of Paediatrics, Eastern Medical College & Hospital, Cumilla, Bangladesh.
[3]Ashik Mahmud, Assistant Professor, Department of Surgery, Brahmanbaria Medical College & Hospital, Brahmanbaria, Bangladesh.
[4]Simul Majumder, Senior Consultant, Sadar Hospital, Cumilla, Bangladesh.
[5]Nilufa Parveen, Professor, Department of Paediatrics, Mainamati Medical College & Hospital, Cumilla, Bangladesh.
[6]Juwel Rana, Assistant Professor, Department of Paediatrics, Central Medical College & Hospital, Cumilla, Bangladesh.
[7]Ruhul Amin, Assistant Professor, Department of Paediatrics, Sylhet Women's Medical College & Hospital, Sylhet, Bangladesh.

Address of Correspondence: Dr. Md. Golam Azam, Assistant Professor, Department of Paediatrics, Brahmanbaria Medical College and Hospital, Brahmanbaria, Bangladesh. Mobile: +8801721502579. Email: azamgolam437@gmail.com

study period. All infants who were suspected of having neonatal sepsis and were admitted to the neonatal unit were enrolled in the study. The presence of one or more of the following clinical features led to the diagnosis of clinical sepsis which includes fever (≥38.0°C), hypothermia (≤36.5°C), respiratory distress, convulsions, lethargy, poor feeding, vomiting, jaundice, bulging fontanels and infection of umbilicus. Newborns whose parents refused to give their informed consent were not included. Fully informed and voluntarily signed consents were obtained from the parents or legal guardians. Parents or guardians were given information sheets detailing the study's purpose. Discontinuation criteria were applied if the baby was discharged or passed away during hospitalization. All examinations and procedures were conducted according to the standard protocols of the ward, and no extra interventions were recommended. All the records of the study population were entered into a data collection sheet and were analyzed using SPSS v22.

Results

In this study hundreds (100) neonates with suspected neonatal sepsis who were admitted in the neonatal unit were included. Table-I shows demographic status of the patients where majority were belonging to 0-14 days that was 45 cases and most of the patients were female patient (60). Figure-1 demonstrated that most of the neonate's birthplace were home (60%) followed by hospital (40%) in this study cases. Figure-2 shows distribution of the neonates based on birth weight where 40% cases were low weight followed by 30% cases where very low birth weight, 20% cases were extremely low birth weight, and 10 % cases were normal birth weight.

Table-I: Demographic status of the study cases (n=100)

Age (days)	Number of Patient
0-14 days	45
15-21 days	35
22-28 days	20
Gender	**Number of Patient**
Male	40
Female	60

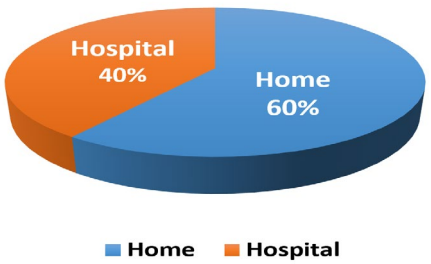

Figure-1: Distribution of neonate according to the place of birth

Table-II: Distribution of the patients according to the clinical history (n=100)

Clinical status	Number of Patients
Poor hygiene	80
Poor cord care	30
Prelacteal feeding	10
Formula feeding	70
Prolong Labour	40
Premature rupture membrane	30
Perinatal Asphyxia	35

Table-III: Clinical features of the study cases (n=100)

Clinical Features	Number of Patients
Lethargic	90
Hyperthermia (fever)	60
Hypothermia	20
Anaemia	30
Jaundice	40
First Breathing	70
Prolonged CRT	30
Tachycardia	50
Convulsion	20
Multiple pustular lesion	10
Umbilical discharge	10

Table-IV: Investigation profile of the study cases (n=100)

Investigations Profile	Number of Patient
Positive CRP	95
TC ≥11000/mm^3 TC<5000/mm^3	80 20
Raised S. haptoglobin	80
Blood procalcitonin	90
Positive chest X-ray	30
Positive blood C/S	95
Meningitis	10

Table-V: Treatment details of the study cases (n=100)

Duration of antibiotic treatment	Number of Patient
5-7 days	60
8-14 days	35
15-21 days	05
Duration of hospital stay	
5-7 days	60
8-14 days	35
15-21 days	05
Mode of discharge	
DA (discharge with advice)	70
DOR (discharge on request)	10
Death	20
Survival rate	
Survived	80
Died	20

Table-II shows the distribution of the patients according to the clinical history where 80 cases had poor hygiene status, followed by 70 cases were formula feeding, 40 cases were in prolong labour, 35 cases were perinatal asphyxia with 30 cases of premature rupture membrane. In table-III, it shows that 90 patients had lethargy, 70 cases had first breathing, 60 patients had fever, 50 cases had tachycardia, 30 cases had anaemia, 40 cases had jaundice, and multiple pustular lesions were found 10 cases. Investigation profile status demonstrated that 95 cases were CRP positive, blood C/S positive were also in 95 cases and chest x-ray positive were in 30 cases. Additionally, 90 cases had raised blood procalcitonin, 80 cases had raised S. haptoglobin. Moreover, among 100 neonates, 10 cases were diagnosed as meningitis by CSF study (table-IV). Figure-3 shows that the most common organism was Streptococcus agalactiae 40% followed by E. coli (20%) and Klebsiella (20%). Besides both the staphylococcus and Pseudomonas were in 10% cases. Table-V shows that 60 cases got their antibiotic treatment in 5-7 days. 60 cases need to hospital stay for 5-7 days and 35 cases need to hospital stay for 8-14 days. 70 cases were discharged with advice and 80 cases were survived after treatment with death rate of 20%.

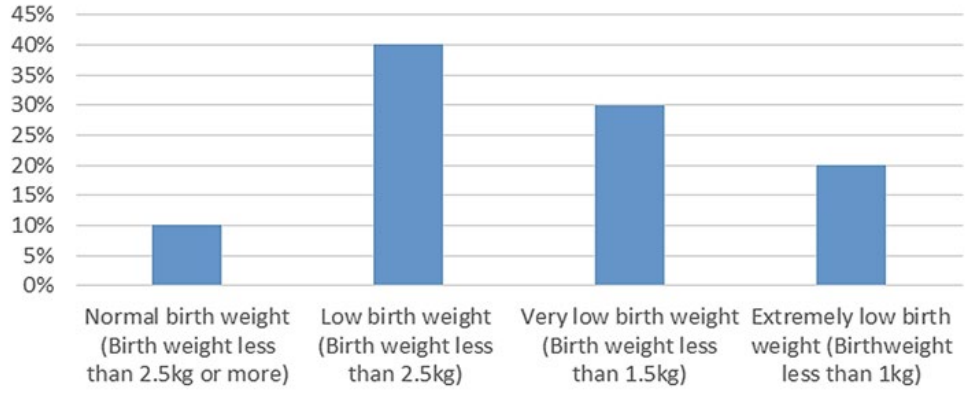

Figure-2: Distribution of the neonates according to their birth weight

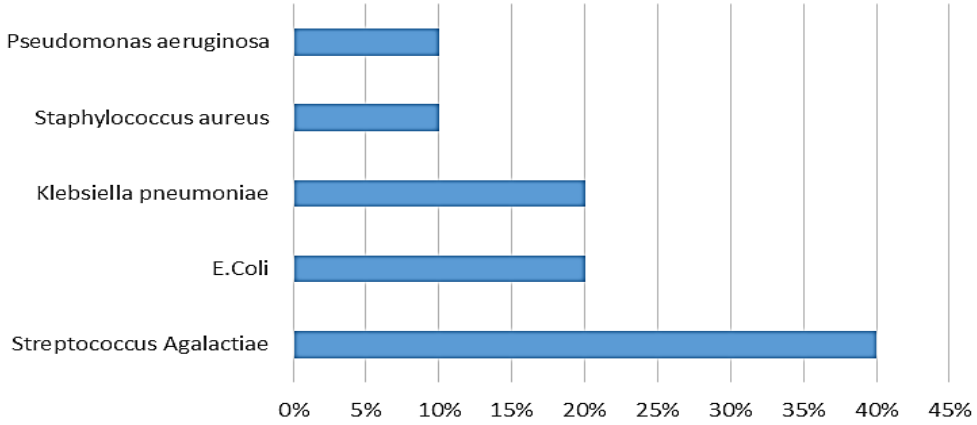

Figure-3: Isolated organism among the study cases (n=100)

Discussion

In this study most of the patients were female (60%). Though most of the study showed male predominant. In one study reported that, 60% were male and 40% were female[15]. This study also reported that presence of infection at the umbilical cord, history of bottle feeding of the neonates and pre-existing maternal infection were significantly related to neonatal sepsis[15]. Whereas in our study 80 cases had poor hygiene status, followed by 70 cases had formula feeding, 40 cases were in prolong labour, 35 cases were prenatal asphyxia with 30 cases of premature rupture membrane.

Another study reported that fever is present in only 10 to 15% of neonates but, when sustained (e.g. >1 hour), generally indicates infection. Additional signs and symptoms include dyspnea, neurological abnormalities such as seizures, jitteriness, jaundice (particularly in the first 3 to 4 days of life), vomiting and distention of the abdomen[16]. We found slight similar results according to study where 90 patients had lethargy, 70 cases had first breathing, 60 patients had fever, 40 cases had jaundice hypothermia had 20 cases and convulsion also had 20 cases. A study showed that Hb level >14 gm/dl was seen in 60% cases and CRP level >6mg/dl was found in 79% cases, which was quite similar to our

study where 95% cases had increased CRP level. In our study, positive chest X-ray was found in 30% cases which is similar to other study where 34% cases showed positive chest X-ray[5,17].

Tsai, et al. in their study showed that the most common isolated microorganism was Klebsiella pneumonia (34.70%), followed by Acinetobacter species (9.83%), pseudomonas aeruginosa (9.23%), and E. coli (8.10%). Less frequent gram-negative organisms isolated were klebsiella and Proteus[6]. Among gram positive organisms, staphylococcus aureus (21.8%) was the most common organism isolated, followed by coagulase negative staphylococci (9.83%). Very few candida species were also isolated[6]. In this study we found different types of outcomes. The most common organism of this study was Streptococcus agalactiae (40%) followed by E. coli (20%) and Klebsiella (20%). Besides both the staphylococcus and Pseudomonas were in 10% cases, which again consistent to other studies[5,7].

Most of the organisms isolated from LOS blood samples (95%-97%) were susceptible to gentamicin+flucloxacillin and gentamicin-amoxicillin/ penicillin, according to recent national surveillance data from the UK. This suggests that the current guidelines for empirical therapy are adequate, and that narrow-spectrum antibiotics can be used to treat most LOS cases[18]. In our study a broad spectrum of antibiotics such as ampicillin, aminoglycoside, Ceftazidime, Meropenem, Vancomycin, Tazobactam, Piperacillin, Colistin etc., and blood transfusion and immunoglobulin were use as an adjuvant therapy. In this study more than half (60%) cases were treated with antibiotics for 5-7 days. The focus was to ensure at least 48 hours of hospital stay as the recent WHO recommendation suggests that 2 days of parenteral antibiotic followed by 5-7 days of oral antibiotic is safe and effective[19].

In the present study, 70% cases were discharged with advice and 80% neonates were survived after treatment with death rate of 20%. The death rate was quite similar to the Kayange et al. study[20].

Limitations

This study was conducted in a single center with small sample size.

Conclusion

In this study lethargy, respiratory distress and fever are typical clinical characteristics of newborn sepsis. Home delivery cases were found to be significant percentage along with prelacteal and formula feeding. Besides that, streptococcus agalactiae was found as a major isolated organism for progression of neonatal sepsis. This study emphasizes that advances in newborn intensive care medicine can be applied to increase sepsis survival. In addition, sepsis risks can be reduced if parents are aware of antenatal natal and postnatal care and proper breast-feeding.

Conflict of Interest

The authors declared that they have no conflicts of interest.

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