Clinico-pathological Profile of Late Onset Neonatal Sepsis in a Tertiary Centre of Nepal

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ABSTRACT

Introduction: Neonatal sepsis is a major cause of neonatal morbidity and mortality. Late onset sepsis is associated with community environment or postnatal exposure to hospital environment. Its incidence is rising due to greater survival of preterm neonates and very low birth weight babies. Because of difference in local epidemiology and possible variation with time, regular monitoring and updates on pathogen and their antimicrobial sensitivity pattern is important for prevention and treatment. The objective of this study was to identify the common symptoms and signs and determine the common bacterial isolates and antibiotic susceptibility pattern of late onset neonatal sepsis.

Methods: This was hospital based prospective observational study conducted among 125 neonates presenting after 72 hours of life and before 28 days, with signs and symptoms of clinical sepsis as per National Neonatology Forum, India criteria and admitted with diagnosis of late onset neonatal sepsis in Kanti Children's Hospital from July 2016 to June 2017.

Results: Poor feeding (89.6%), fever/hypothermia (47.2%), excessive/poor cry (40.8%) and irritability/ lethargy (33.6) were the common symptoms. Staphylococcus aureus and Coagulase Negative Staphylococcus, the most predominant organisms, were isolated in 66.7% and 18.5% of culture positive cases respectively. Most of the isolated organisms showed sensitivity to cloxacillin (16/27), amikacin (15/27), ciprofloxacin (14/27), cefotaxime (11/27), cotrimaxazole (6/27) and amoxyclox (6/27).

Conclusions: Poor feeding, fever/hypothermia, excessive/poor cry and irritability/lethargy were the common symptoms. This study has indicated possible emergence of Staphylococcus aureus as the dominant cause of late onset neonatal sepsis. Cloxacillin, amikacin, ciprofloxacin and cefotaxime were more effective against the commonly isolated bacteria in late onset neonatal sepsis.

Key words: antibiotic sensitivity; bacteriological profile; late onset neonatal sepsis

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INTRODUCTION

Neonatal sepsis is a clinical syndrome characterised by signs and symptoms of infection with or without accompanying bacteraemia in the first month of life.[1] It is responsible for about 30% to 50% of the total neonatal deaths in the developing countries.[2,3] Neonatal sepsis can be divided into two sub-types depending upon whether the onset of symptoms is within the first 72 hours of life (EONS) or after 72 hours of life (LONS).[4] The source of infection in LONS is either nosocomial (hospital-acquired) or community-acquired.[5,6] Improved survival of preterm and very low birth weight babies with modern NICU care and prolonged hospitalisation have resulted in increasing incidence of LONS, which varies from 0.61% to 14.2% among hospitalised neonates.[7-9] The organisms responsible for early onset and late onset sepsis are different. Blood culture is time-consuming and antibiotics are administered empirically before results of culture and sensitivity are available. The pattern of pathogens and their antibiotic sensitivity pattern in LONS should be re-evaluated regularly as it changes over time and regions. Antibiotic resistant strains like MRSA has been of major concern lately.

METHODS

This was hospital based prospective study conducted among the neonates presenting after 72 hours of life and before 28 days, with signs and symptoms of clinical sepsis as per National Neonatology Forum criteria (NNF), India and admitted with diagnosis of LONS in Neonatal Intermediate Care Unit (NIMCU) and Neonatal Intensive Care Unit (NICU) of a Children's Hospital in Kathmandu, Nepal from July 2016 to June 2017.

The neonates were suspected having late onset neonatal sepsis if they presented with one of the following signs or symptoms at or after 72 hrs of life: fever (temperature >38°C), hypothermia (temperature <36°C), decreased sucking, poor sucking or not sucking, lethargy, irritability, seizure, apnea, cough, respiratory distress, abdominal distention. Blood samples were collected by aseptic vein puncture and were subjected to bacteriological culture. Blood sample collected for culture was incubated at 37^0C over night and sub-culture on MacConkey agar was done. Growth negative culture was further incubated for another three days watching for growth every 24 hrs. After informed written consent LP was done. CSF was collected in two sterile vials: one for total count, differential count, protein and sugar and another for Gram stain and culture. The vials were sent to the Emergency laboratory for analysis. Cranial USG was performed in neonates with meningitis. The level of significance for tests was set at p <0.05. Data analysis was done using statistical package for social sciences (SPSS) software version 20.0. Ethical approval was obtained from Ethical Committee of the Hospital. Written informed consent was obtained from the guardians of the neonates before enrolling in to the study.

RESULTS

A total of 125 neonates admitted with the diagnosis of late onset neonatal sepsis during the study period (July 2016 to June 2017) were included in this study. 70.4% of cases were of normal birth weight followed by 27.2% with low birth weight and 2.4% neonates were less than 1.5 kg. There was male preponderance (69%) with male: female ratio 2.2:1. 5.6% neonates enrolled in the study were preterm, 92.0% were full term and 2.4% were post-term. 20% neonates were from Kathmandu valley and 80% were from outside valley. 93 neonates (74.4 %) were delivered via SVD, two (1.6%) were delivered via instrumental delivery and remaining 30 neonates (24.0%) were delivered via LSCS. Poor feeding (89.6%), fever/hypothermia (47.2%), excessive/poor cry (40.8%) and irritability/lethargy (33.6) were the common symptoms in the neonate with sepsis, followed by jaundice (28.8%), tachypnea/grunting (20.8%), vomiting/abdominal distention (13.60%), and convulsion (7.20%). Other symptoms like diarrhoea, cyanosis, poor reflex, pustules, and sclerema were present in below five percentages of cases. 13 neonates (10.4%) received some medical treatment while 112 (89.6%)

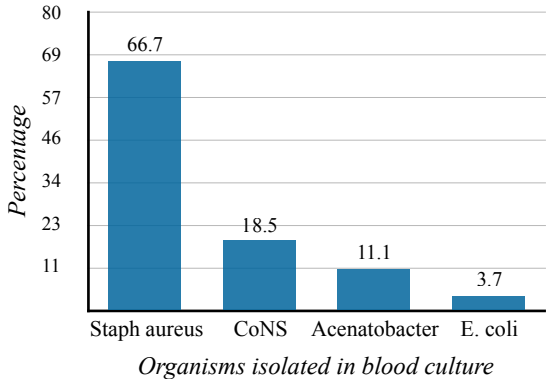

Figure 1. Distribution of study population on basis of organism isolated in blood culture

neonates didn't receive any medical treatment before reaching KCH. CRP was positive in 31.2% (39/125). Abnormal haemoglobin level (42.4%), abnormal total count (16.0%), thrombocytopenia (12.8%), low ANC (4%) were major laboratory abnormalities detected. Blood culture was positive in 27 out of 125 cases, which accounted for 21.6% of total cases. *Staphylococcus aureus* was the most common organism isolated in blood culture followed by Coagulase negative Staphylococci (CoNS) (figure 1). Antibiotic sensitivity pattern showed that most of the cases were sensitive to cloxacillin followed by amikacin, ciprofloxacin and cefotaxime (Table 1).

Table 1. Distribution of study population on basis of antibiotic sensitivity pattern

SN	Antibiotic	Number	Percentage (%)
1	Cloxacillin	16	19.8
2	Amikacin	15	18.5
3	Ciprofloxacin	14	17.3
4	Cefotaxime	11	13.6
5	Cotrimoxazole	6	7.4
7	Amoxycillin+ Cloxacillin	6	7.4
8	Cefixime	5	6.1
9	Amoxycillin	4	4.9
10	Meropenem	1	1.2
11	Ofloxacin	1	1.2
12	Cefalexin	1	1.2
13	Ceftazidime	1	1.2
14	Total	81	100

DISCUSSION

In this study, male predominance was observed which is comparable to findings in other studies.[10,11] This suggests the possibility of sex linked factor in host susceptibility and genetic susceptibility of male patients to infection. In our part of world, it might also be due to patriarchal system of our society which gives more emphasis to the male child.

The signs and symptoms of sepsis are non-specific and demand a high degree of suspicion for early diagnosis. The symptoms with which the parents or caretakers presented in this study is almost comparable with the findings in other study.[10]

In this study blood culture was positive in 27 out of 125 cases, which accounts for 21.6% of total cases. In similar study conducted among the neonates with sepsis by Shrestha NJ et al., organisms were isolated in 6.1% of the collected blood samples.[11] In a study done by Chapagain RH et al., 14% of the suspected cases had positive blood culture.[12] This study was conducted in a tertiary care hospital where most of the cases were referred from other hospitals and health facilities. Many of these babies (10.4%) had already received antibiotics prior to referral rendering their blood culture sterile.

The organism isolated in blood culture in this study is almost comparable to findings in other study.[12] In another study Staphylococcus aureus remained the predominant isolate followed by *Klebsiella spp.*[13] In yet another study *Staph aureus* was more common in late onset sepsis as compared with early onset sepsis and was statistically significant.[11] In study done in Australia among babies with late onset neonatal sepsis the vast majority of infections (73%) were caused by Gram-positive organisms, with CoNS accounting for 39.8% of infections.[14]

The sensitivity pattern in our study is almost similar to findings of other similar study.[12] In a study done in Chitwan most of the gram positive

isolates exhibited higher resistance to penicillin and cephalosporin. Susceptibility to commonly used aminoglycosides and quinolones was found.[13]

CONCLUSIONS

Poor feeding, fever/hypothermia, excessive/ poor cry and irritability/lethargy were the common symptoms. This study has indicated possible emergence of Staphylococcus aureus as the dominant cause of late onset neonatal sepsis. Cloxacillin, amikacin, ciprofloxacin and cefotaxime were more effective against the commonly isolated bacteria in late onset neonatal sepsis.

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Conflict of Interest: None declared

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