REVIEW ARTICLE

JPAR 2018

Journal of Pharmaceutical Advanced Research

(An International Multidisciplinary Peer Review Open Access monthly Journal)

Available online at: www.jparonline.com

Neonatal Sepsis - A review

Itika Singh[1*], Harminder Singh[2], Devindra Kaur[3]

[1]Kalpana Chawla Govt. Medical College, Near Hospital Chowk, Karnal - 132001, Haryana, India.
[2]Orthopedic surgeon, Civil Hospital, Subhash Road, Rohtak - 124001, Haryana, India.
[3]Gynaecologist, Civil Hospital, Subhash Road, Rohtak - 124001, Haryana, India.

Received: 19.06.2018 Revised: 24.06.2018 Accepted: 27.06.2018 Published: 30.06.2018

ABSTRACT: Infections, premature births and birth asphyxia constitute the major causes of neonatal sepsis. Infection is the primary cause of mortality in 18.6% of intramural neonates in which Infection is the primary cause of mortality in 18.6% of intramural neonates in which Infection is the primary cause of mortality of intramural neonates out of which *Klebsiella pneumoniae* is the most frequent isolate followed by *Staphylococcus aureus*. In early onset neonatal sepsis, 85 % cases occur within 24 h, 5 % in 24 to 48 h and rest occur in 48 to 72 h and acquired from mother via transplacental transfer or ascending infection from cervix from the organisms colonizing mothers' genitourinary tract. Late onset sepsis occurs at 4 to 90 days of birth and is environmentally acquired. Most common causes of death are septicemia, meningitis, respiratory infections, diarrhea, and neonatal tetanus. Neonatal sepsis manifests as alteration in established feeding behavior, vomiting, diarrhea, hyperthermia or hypothermia, absent reflexes, hypotonia, lethargy, hepatomegaly, anemia, petechiae, sclerema, umbilical redness and discharge, seizures, blank look and coma. Management is supportive as well as by antibiotics. There is a significant gap in our knowledge regarding neonatal sepsis and studies are needed to reduce the burden of neonatal sepsis so that sustainable interventions can be made to reduce neonatal mortality.

Corresponding author*
Miss. Itika Singh
Kalpana Chawla Govt. Medical College,
Near Hospital Chowk, Karnal - 132001,
Haryana, India.
Mail ID. itika8@gmail.com
Tel No. +91

Keywords: Neonata, Sepsis, asphyxia, Antibiotics, Mortality.

INTRODUCTIONS:

According to World Health Organization (WHO) estimates, there are about 5 million neonatal deaths a year, 98 % occurring in developing countries [1,2]. Infections, premature births and birth asphyxia constitute the major causes. Genetic association, immature immune defenses, environmental and maternal factors contribute to the risk neonatal sepsis, morbidity, and mortality, particularly in preterm and/or very low birth weight (VLBW) infants [3]. Infection is the primary cause of mortality in 18.6 % of intramural neonates, in which infection is the primary cause of mortality in 18.6% of

intramural out of which *Klebsiella pneumoniae* is the most frequent organism (32.5 %) followed by *Staphylococcus aureus* (13.6 %). Also, in extramural admissions, Klebsiella is the commonest bacteria responsible (27.5 %) followed by *S. aureus* (14.9 %) [4,5]. Overall, gram negative organisms are more common and mainly include Klebsiella, *Escherichia coli*, pseudomonas, and salmonella [6-8]. Among gram positive organisms, *Staphylococcus aureus*, coagulase negative staphylococci, i.e. *Streptococcus pneumoniae* and *Streptococcus pyogenes* are most commonly isolated bacterias [6-10].

Neonatal sepsis can be early onset sepsis (EOS) and late onset sepsis (LOS). EOS range from 2 to 6 days after delivery. A few papers distinguish between very early onset (within 24 h), EOS (24 h to 6 days), and LOS (more than 6 days) sepsis [6,7]. Increased risk of EOS is associated with low birth weight (LBW), preterm delivery, premature rupture of membrane (PROM), febrile illness of mother 2 weeks before delivery, foul smelling liquor amnii, perinatal asphyxia, prolonged instrumentation delivery with difficulty. Risk factors for LOS include LBW, premature baby, poor hygiene, umbilical sepsis, prelacteal feeding, and aspiration of food [11].

Epidemiological Aspect:

In developing countries, neonatal mortality (deaths in the first 28 days of life per 1000 live births) from all causes is about 34; most of these deaths occur in the first week of life, most on the first day (WHO 2001 Estimates) [12]. In contrast, neonatal mortality for developed countries is in the region of five. Neonatal mortality for different African countries ranges from 68 in Liberia to 11 in South Africa [12].

MATERIAL AND METHODS:

A review study was conducted. The data presented in the review study is derived from the papers selected and is not subjected to any further statistical analysis.

OBSERVATIONS:

In early onset neonatal sepsis, 85 % cases occur within 24 h, 5 % in 24 to 48 h and less occur in 48 to 72 h. Early onset neonatal sepsis is acquired from mother via transplacental transfer or ascending infection from cervix from the organisms colonizing mothers' genitourinary tract. This is caused by organisms like Group B staphylococcus (GBS), *E coli*, coagulase negative staphylococcus, *H. Influenza*, listeria monocytogens [13]. With intrapartum antibiotic prophylaxis, rates of 93.3 %, 0.36 of 1000 infants developed early onset GBS disease [14,15]. Late onset sepsis occurs at 4 to 90 days of birth and is environmentally acquired. This is caused by coagulase negative staphylococci, S. aureus, E.Coli, GBS, pseudomonas, klebsiella. Trends in late onset sepsis show an increase in coagulase negative streptococcal sepsis, most of these isolates are susceptible to first generation cephalosporins [16]. The most common causes of death in the neonatal period are infections, including septicemia, meningitis, respiratory infections, diarrhea, and neonatal tetanus (32 %), followed by birth asphyxia and injuries (29 %), and prematurity (24 %) [12]. In developing countries, the rate of home deliveries is high, and the percentage of deliveries assisted by a skilled attendant is low: in Africa it ranges from 37 % in sub-Saharan Africa to 69 % in North Africa, in Asia from 29 % in South Asia to 66 % in East Asia and the Pacific region. In South America and the Caribbean, it is about 83 % [12].

DISCUSSION:

Most common cause of neonatal mortality is sepsis. Neonatal sepsis manifest as alteration in established feeding behavior, vomiting, diarrhea, hyperthermia or hypothermia, absent reflexes, hypotonia, lethargy, hepatomegaly, anemia, petechiae, sclerema, umbilical redness and discharge, seizures, blank look and coma. Griffin etal found that abnormal heart rate characteristics such as reduced variability and transient decelerations occurred 24 h prior to onset of symptoms in sepsis and sepsis like illness [16]. Another group found that sample asymmetry of RR interval increased in 3 to 4 days preceding sepsis with the steepest increase in last 24 hours which shows signs of cardiac deterioration [17]. De Felice, *et al*. used calorimetric analysis of skin color for severity of sepsis [18]. The condition can be diagnosed by blood culture, sepsis screen, lumbar puncture, urine culture, radiological investigations. Newer diagnostic tests include cell surface markers (CD11b, CD64), cytokines, G-CSF, acute phase proteins (C- reactive proteins) and molecular genetics. Management is supportive as well as by antibiotics. Nursing should be thermoneutral environment. Colloids and inotropes are given to maintain blood pressure and perfusion of the tissues. Packed red cells and fresh frozen plasma (FFP) are given to manage anemia and bleeding. In case of community acquired sepsis, ampicillin and gentamicin

combination is advised for pneumonia and septicemia. If meningitis, then broad spectrum cephalosporin (like cefotaxime) is added. With high resistant strains, piperacillin-tazobactum or methicillin-vancomycin are preferred. In case of pseudomonas infection, amikacin is added. Methicillin resistant staphyloccus aureus (MRSA) are treated using amikacin with ciprofloxacin. Newer antibiotics or reserve antibiotics like aztreonam, imipenum are available for treatment of neonatal sepsis.

CONCLUSION:

As the signs and symptoms are non specific, it is not easy to clinically diagnose neonatal sepsis and no laboratory test has 100% specificity and sensitivity, hence a continuous search is needed for a reliable test. There is a significant gap in our knowledge regarding neonatal sepsis and urgent work and studies are needed to reduce the burden of neonatal sepsis so that sustainable interventions can be made and neonatal mortality can be reduced.

ACKNOWLEDGEMENT:

Authors wish to thanks Kalpana Chawla Govt. Medical College and City Hospital for providing facilities to carry out this review study.

REFERENCES:

1. WHO. Perinatal mortality. Report No. WHO/FRH/MSM/967. Geneva: WHO; 1996.
2. Stoll BJ. The global impact of neonatal infection. Clin Perinatol, 1997; 24: 1–21.
3. Srinivasan L, Kirpalani H, Cotten CM. Elucidating the role of genomics in neonatal sepsis. Semin Perinatol, 2015; 39 (8): 611-616.
4. Sankar MJ, Agrawal A, Deodari AK, Paul VK. Sepsis in the newborn. Indian J Pediatr, 2008; 75(3): 261-266.
5. Sudaram V, Kumar P, Dutta S, *et al*. Blood culture confirmed bacterial sepsis in neonates in a north Indian tertiary care center: changes over the last decade. Jpn J Infect Dis, 2009; 62(1): 46-50.
6. Tallur SS, Kasturi AV, Nadgir SD, Krishna BV. Clinico-bacteriological study of neonatal septicemia in Hubli. Indian J Pediatr, 2000; 67: 169-174.
7. Karunasekera KA, Pathirana D. A preliminary study on neonatal septicaemia in a tertiary referral hospital paediatric unit. Ceylon Med J, 1999; 44: 818-6.
8. Karthikeyan G, Premkumar K. Neonatal sepsis: *Staphylococcus aureus* as the predominant pathogen. Indian J Pediatr, 2001; 68: 715-717.
9. Muhe L, Tilahun M, Lulseged S, Kebede S, Enaro D, Ringertz S, *et al*. Etiology of pneumonia, sepsis and meningitis in infants younger than three months of age in Ethiopia. Pediatr Infect Dis J, 1999; 18(10): S56-S61.
10. Gatchalian SR, Quiambao BP, Morelos AM, Abraham L, Gepanayao CP, Sombrero LT, *et al*. Bacterial and viral etiology of serious infections in very young Filipino infants. Pediatr Infect Dis J, 1999; 18(10): S50-S5.
11. Kaftan H, Kinney JS. Early onset neonatal bacterial infection. Semin Perinatol, 1998; 22(1): 15-24.
12. Costello A, Francis V, Byrne A, Puddephatt C. The state of the world's newborns. Washington: Save the Children Fund; 2001.
13. Klinger G, Levy I, Sirota L, Boyko V, Reichman B, Lerner- Geva L, *et al*. Epidemiology and risk factors for early onset sepsis among very-low-birthweight infants. Am J Obstet Gynecol, 2009; 201(1): 38.e1-6.
14. Van den HA, Gerards LJ, Verboon-Maciolek MA, Fleer A, Krediet TG. Long-term trends in the epidemiology of neonatal sepsis and antibiotic susceptibility of causative agents. Neonatol, 2010; 97(1): 22-28.
15. Lin FY, Weisman LE, Azimi P, Young AE, Chang K, Cielo M, *et al*. Assessment of Intrapartum Antibiotic Prophylaxis for the Prevention of Early-onset Group B Streptococcal Disease. Pediatr Infect Dis J, 2011; 30(9): 759-763.
16. Griffen MP, Lake DE, Oshea TM, Moorman JR. Heart rate characteristics and clinical signs in neonatal sepsis. Pediatr Res, 2007; 61(2): 222-227.
17. Kovatchev BP, Farhy LS, Cao H, Griffin MP, Lake DE, Moorman JR. Sample asymmetry of heart rate characteristics with application to neonatal sepsis and systemic inflammatory response syndrome. Pediatr Res, 2003; 54(6): 892-898.
18. De Felice C, Flori ML, Pellegrino M, Toti P, Stangherllini E, Molinu A, *et al*. Predictive value of skin color for illness severity in the high risk newborn. Pediatr Res, 2002; 51: 100-105.

Conflict of Interest: None

Source of Funding: Nil

Paper Citation: Singh I, Singh H, Kaur D. Neonatal Sepesis - A review. J Pharm Adv Res, 2018; 1(5): 268-270.