Some of clinical characteristics of neonatal sepsis in Children's hospital at Kirkuk city, Iraq

Dr. Sayran Atallah Faiq [1], [1]M.B.CH.B. F.I.B.M.S in pediatrics

Dr. Jinan Naif Najem [2] [2] M.B.Ch.B. pediatric surgery

ABSTRACT

Background: Neonatal sepsis is a significant cause of mortality & long-term morbidity. The preterm infant has high-risk for sepsis & its sequelae . Low birth weight neonates were more susceptible to sepsis. This study aims to describe some of characteristics of neonatal sepsis in neonatology intensive care unit of pediatric hospital.

Aim of study: comparison of sepsis in term versus preterm neonates with Normal weight versus low birth weight "LBW".

Patients &Methods: A retrospective observational cross-sectional study done on neonates treated in neonatology intensive care unit"NICU"of children's hospital at Kirkuk ,Iraq from March2021_November2021.The sample of the study is infants aged zero to 28 days with neonatal sepsis. Variables studied were birth weight ,gender of infant, gestational age either term or preterm , and onset of sepsis(early-onset or late-onset).

Results: A total of 440 neonates were admitted to NICU from first of March 2021 to first of November 2021.From these neonates 220(50%) were diagnosed on clinical criteria & treated as sepsis, there was male predominance(57.7%) compared to female(42.3%). Early-onset sepsis (57.4%) while late-onset sepsis(42.6%) in LBW neonates. Most LBW neonates were preterm.

Conclusion: Fifty percent of admitted neonates had neonatal sepsis. Most LBW were preterm neonates ,both prematurity & LBW in neonates are risk factors for sepsis.

Keywords: Early-onset sepsis, late- onset sepsis, low birth weight(LBW), premature and term.

Introduction

The incidence of neonatal sepsis varies from 1_4 cases per 1000 live births in developed countries like USA.(1) In developing countries like Ethiopia as many as 2% of fetuses are infected in utero and 10% of infants are infected in the first month of life.(2) Newborns are the most vulnerable children and many conditions that result in a newborn death can be prevented by providing combined approach to mother and her baby during her pregnancy ,delivery, and effective care after delivery. Infections are a frequent and important cause of morbidity and mortality in the neonatal period.(2) The terms early-onset and late-onset neonatal infections refer to the age at onset of infection in the neonatal period. Originally divided as infections occurring before and after first week of life. Early-onset infections are acquired before or during delivery. Late-onset infections are acquired after delivery in neonatal intensive care unit "NICU" or in community, these post natal infections may be transmitted by direct contact with hospital personnel, the mother, or other family members, from milk or from contaminated equipment. The most common source of postnatal infections in hospitalized newborns is hand contamination of health care personnel. The most important neonatal factor

predisposing to infection is prematurity or LBW. Preterm have a three to ten fold higher incidence of infection than full term ,normal birth weight infants do.(1) Our society is careless most of the time ,delay bringing the infant to medical care, dangerous signs like fits ,bleeding tendency, poor feeding and decrease urine output which are missed by a naive care giver. Preterm babies require frequent feeding and patience during feeding because they become hungry easily, when ill they are flaccid & have weak sucking , weak cry. Since LBW infants are surviving pregnancy ,it became the duty of health care providers to help these delicate creatures too pass the first month of their journey in this life. Proper care" medical & nursing" will help to reduce the mortality and morbidity of these infants, which is the aim of the medical team.

Results

440 neonates were admitted to NICU of children's hospital at Kirkuk city ,Iraq from first of March 2021 to first of November 2021.Of these neonates 220(50%) were diagnosed and treated as sepsis as figure 1. 127(57.7%) were male while 93(42.3%) were female as shown in figure 2. Of sepsis cases 126(57.2%) has weight 2.5 kilograms &more which is considered normal weight, while 94(42.8%) has weight 2.499 kilograms & less which is considered low birth weight" LBW". Term neonates 145(65.9%) while 75(34.1%) were preterm. 111(50.46%) neonates had early-onset sepsis while 109(49.54%) neonates had late-onset sepsis. 75(79.7%) of LBW were preterm while 19(20.3%) of LBW were term figure 3. The LBW were 94 neonates.54(57.4%) neonates with LBW had early onset sepsis while40(42.6%) neonates had late-onset sepsis as in table 1. 38(50.6%) of preterm neonates had early-onset sepsis while 37(49.4%) of preterm neonates had late-onset sepsis. Table 2

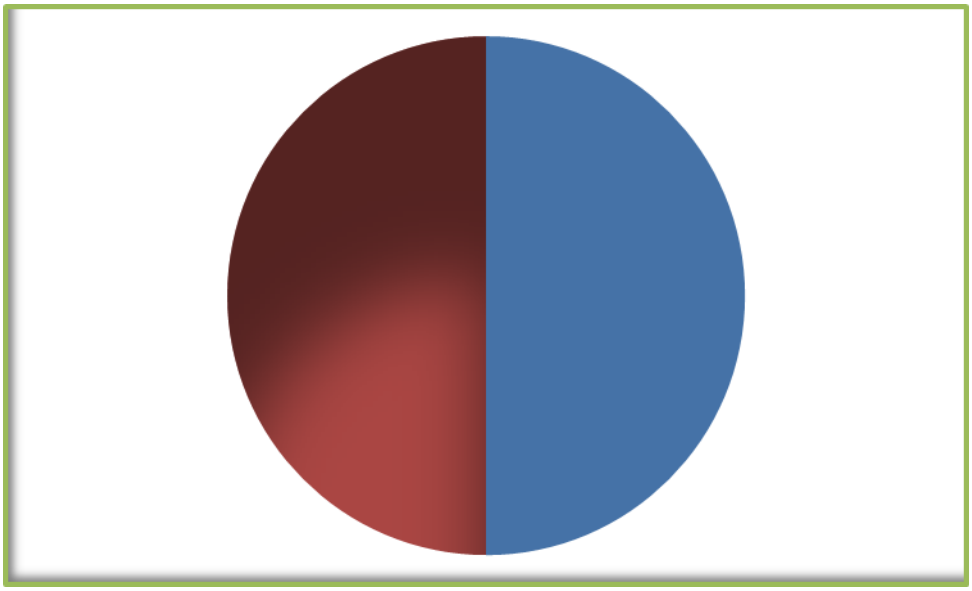

Figure (1): percentage of sepsis (50%) from total admission to NICU (P>0.05).

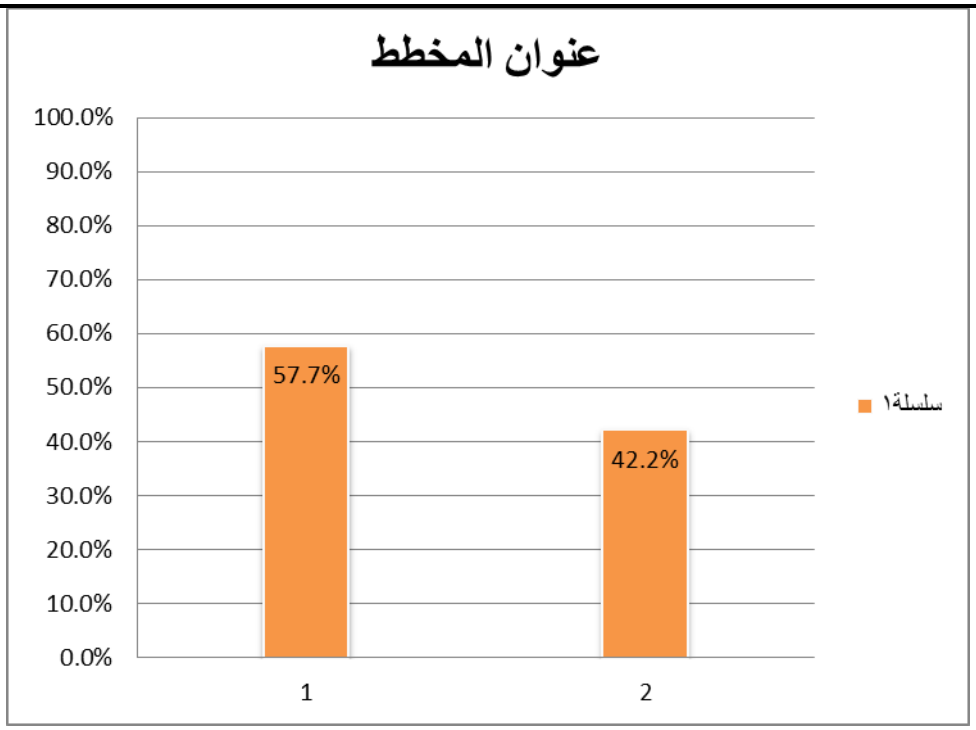

Figure (2): percentage of male vs. Female neonatal sepsis (P>0.05)

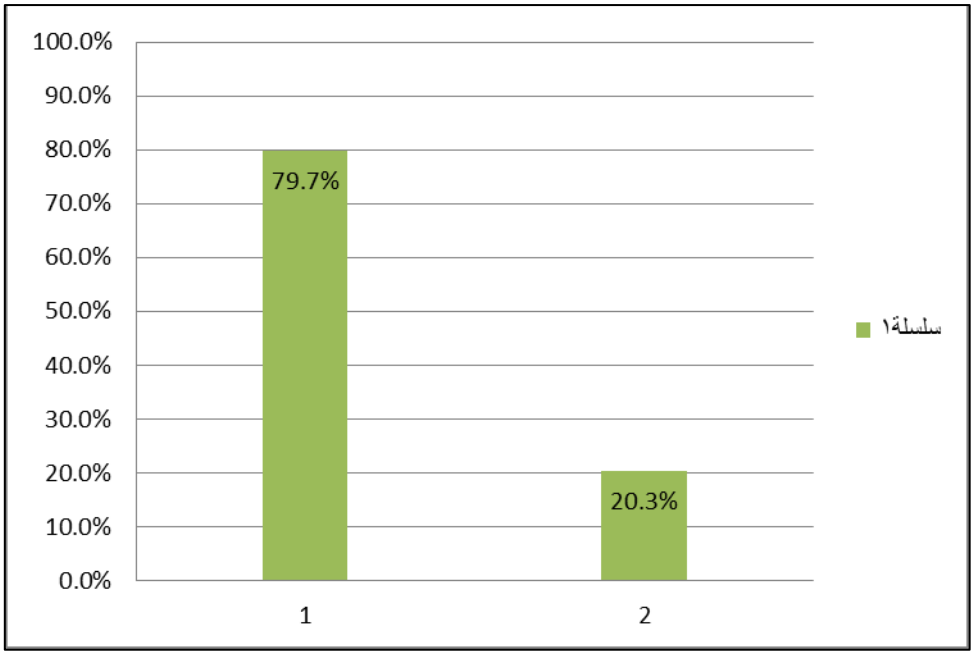

Figure (3): percentage of preterm vs. Term in LBW sepsis (P<0.05)

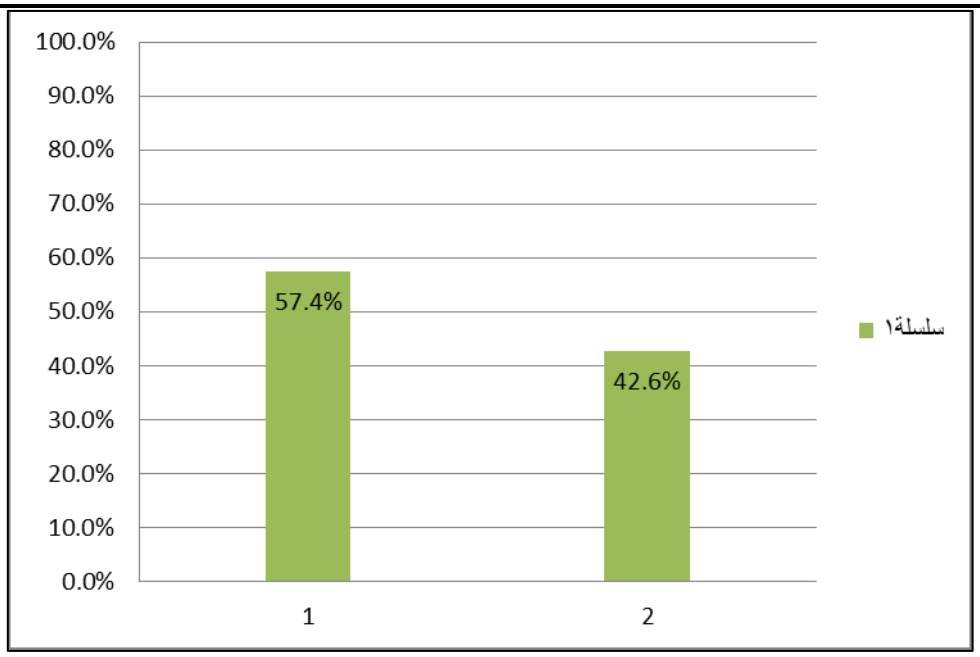

Figure (4): percentage of early onset sepsis vs. late onset sepsis in LBW (P>0.05)

Table (1): The distribution of sepsis in Normal weight versus LBW

	Normal	LBW	Total
Early - onset Sepsis	57	54	111
Late - onset Sepsis	69	40	109
Total	126	94	220

P<0.05

Table (2): The distribution of sepsis in Term & Preterm neonates

	Term	Preterm	Total
Early – onset Sepsis	73	38	111
Late – onset Sepsis	72	37	109
Total	145	75	220

P>0.05

Discussion:

Neonatal sepsis is a clinical syndrome that arises due to a systemic inflammatory response that occurs as a result of bacterial ,viral ,or fungal infection that occur in the first month.127 neonate (57.7%) were male while 93(42.3%)were female. A predominance of male infant is apparent in almost all studies of sepsis in the newborn infant. The usual male predominance in neonatal sepsis has suggested the possibility of a sex-linked factor in host susceptibility. A gene located in the X-chromosome and involved with function of the thymus or with a synthesis of immunoglobulins has been postulated.(3) The most important neonatal factor predisposing to infection is prematurity or LBW. Preterm infants have a three to ten fold higher incidence of infection than term, normal birth weight infants do. A number of possible explanations exist ,{1}: maternal genital tract infection is considerd to be an important cause of preterm labor, with an increased risk of vertical transmission to the newborn {2}: the frequency of amniotic infection is inversely related to gestational age {3}: premature infants have documented immune dysfunction.(1) Neonatal sepsis was influenced by different factors in a study done by Belachew A, Tewabe T, preterm newborn infants were 3.36 times more likely to develop

neonatal sepsis compared to term newborns. The possible explanation is that preterm infants have immature immune system(low neutrophil storage) and body organs that fight infection. Due to this, when health professional undergoing procedures like invasive treatment & may be exposed to nosocomial infection ,these preterm infants are more prone to develop neonatal sepsis. There is rapid exhaustion of bone marrow reserve during sepsis. Nowadays immune replacement therapies are widely explored for correcting the immune deficiencies of preterm, and it is one of the measures used to prevent neonatal infection.(2,6,7) Premature infants often require prolonged intravenous access, endotracheal intubation or other invasive procedures that provide a portal of entry or impair clearance mechanism of microbes. The terms early-onset and late-onset infection refer to the age at onset of infection in the neonatal period. Originally divided arbitrarily as infections occurring before and after first week of life, it is more useful to separate early and late-onset infections according to peripartum pathogens.(1) Attack rates of neonatal sepsis increase significantly in LBW infants in the presence of maternal chorioamnionitis, congenital immune defects, asplenia and malformations(obstructive uropathy) leading to high inocula of bacteria. Intrapartum antibiotics are used to reduce vertical transmission of GBS" Group B Streptococci" ,as well as lessen neonatal morbidity after premature rupture of membrane. After the introduction of selective intrapartum antibiotic prophylaxis to prevent perinatal transmission of GBS, rates of early-onset neonatal GBS infection in USA declined from1.7 per 1000 live birth to 0.6per1000 . Intrapartum chemoprophylaxis has had no effect on late-onset GBS disease.

Late-onset sepsis is community acquired or nosocomial infection or hospital acquired infections which are responsible for significant morbidity and late mortality in hospitalized newborns.

The CDC" The Center for Disease Control& Prevention" defines a nosocomial infection as an infection occurring after admission to the NICU that was not transplacentaly acquired. The majority of nosocomial infections occur in preterm or term infants who require special care.

Risk factors for nosocomial infection in these infants include prematurity, LBW, invasive procedures, indwelling vascular catheters, parenteral nutrition, endotracheal tubes, ventricular shunts, alteration in the skin and/or mucous membrane barriers ,frequent use of broad- spectrum antibiotics and prolonged hospital stay. From94 neonates with LBW 75(79.7%) were preterm &19 (20.3%) were term. The birth weight of the newborn was one of the determining factors for neonatal sepsis. Newborns with weight less than 2.5 kilograms were 1.42 times more likely to develop neonatal sepsis than newborn with weight 2.5 kilograms and more. This may be due to LBW babies are mostly premature, unable to feed properly , easily lose their heat, they have low store of glucose and more likely to develop hypoglycemia, all these may increase the likelihood of neonatal sepsis.(2,5) . Early-onset sepsis dominates in LBW neonates 54infants (57.4%) of 94 LBW infants while late onset sepsis in LBW neonates 40(42.6%) infants. This can be explained by the major risk of infection in premature rupture of membrane in pregnant women, most LBW are preterm ,although preterm babies have many reasons to be admitted to hospital starting from RDS ,cold injury, hypoglycemia but sepsis remain the main cause of admission. Systemic inflammatory response associated with sepsis ,cause damage to organs that are still immature and poorly adopted to extra-uterine life. So, by proper treatment of sepsis (not only antibiotics but supportive measures like oxygen, immunoglobulin, parenteral fluid ,nutrition and vitamins, a burden can be carried away from already struggling body organs such as lungs and kidneys.

The skin is the first barrier in front of micro-organisms, unfortunately this barrier is delicate in LBW infants. Hand washing is the gold standard to reduce the risk of sepsis and nosocomial infection in NICU, but it is not done properly or frequently by care givers or health care providers, so the alternative is alcohol

rubbing of hands before dealing with or examining these LBW infants. Alcohol rubbing of hands is easier & more practical in crowded NICU. Taking care of LBW infant is a big challenge for mothers and health care providers ,these infants differ from term infants ,they do not have the strong sucking as term infants, so they require more frequent feeding and smaller amounts each feeding with patience during feeding because they become tired easily, they lack the vivid strong cry of term infants when hungry. They develop dangerous signs "fits "due to many causes hypoglycemia, meningitis ,electrolyte disturbance. Some times bleeding tendency from vitamin K deficiency, which may be missed by a naive care giver. Poor feeding & decrease urine out put, is the sign which make families bring these babies to medical care. Premature and VLBW newborns have improved survival but remain in the hospital for a long time in an environment that puts them at continuous risk for acquired infections (8,9)

Conclusion:

1. Neonatal sepsis is the major cause of admission to NICU at children's hospital ,Kirkuk city ,Iraq.
2. Prematurity and LBW are important risk factors for neonatal sepsis.
3. Early –onset neonatal sepsis can be reduced by increased awareness of pregnant women about the risk of infection transmitted during labor.
4. Late-onset sepsis can be reduced by prevention of health care associated infection, and by improving the quality of sepsis control measures like hand washing and avoidance of crowding in NICU.

References:

1. Stoll B. Infections of the neonate infant. In Behrman R E, Kliegman R M, Jenson HB, eds.Nelson Textbook of Pediatrics.17th edition.WB Saunders Co:Philadelphia PA:2004:98:623-633.
2. 2.Belachew A,Tewabe T.Neonatal sepsis and its association with birth weight and gestational age among admitted neonates in Ethiopia: systematic review& meta-analysis.BMC.2020; 20-55.
3. 3.Washburn T,Medearis DN Jr,Childs B.Sex differences insuceptibility to infections.Pediatrics.1985;35:57-60.
4. 4.Jain NK,JainVM, Maheshwari S.Clinical profile of neonatal sepsis. Kathmandu Univ Med J(KUMJ).2003;(2):117-20.
5. 5.Stoll BJ, Gordon T, Korones SB,Shankaran S,Tyson JE,Bauer CR,et al.Late_onset sepsis in very low birth weight neonates: a report from the National Institude of Child Health and Human Development Neonatal Research Network. Journal of Pediatrics.1996;129(1):63-71.
6. 6.Kumar SKM, Bhat BV. District mechanisms of the newborn innate immunity. Immunology Letters.2016;173:42-54.
7. 7.Kan B,Razzaghian HR,Lavoie PM. An immunological perspective on neonatal sepsis. Trends in Molecular Medicine. 2016;22(4):290_302.
8. 8.Simiya E. Morbidity and mortality of the low birth weight infants in newborn unit in Kenyatta National Hospital ,Nairobi. East African Med J.2004; 81(7):367-74.
9. 9.Assa NP,Artana WD.The characteristics of neonatal sepsis in Low Birth Weight(LBW) infants at Sanglah General Hospital ,Bali, Indonesia. Intisari Sains Medis.2020;(11):172-178.