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Case Report

Neonatal Sepsis in Low Birth Weight Infants in Dr. Soetomo General Hospital

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ABSTRACT

Infections of the newborn are a significant cause of mortality. Preterm infant have a high risk sepsis.. The incidence of neonatal sepsis is 1 to 10 cases per 1000 live births and 1 per 250 live premature births. To describe the characteristics of neonatal sepsis in the low birth weight infant in the neonatal intensive care unit Dr. Soetomo Hospital. Retrospective analysis. The data were collected from the medical record of low birth weight infants who were diagnosed as sepsis in neonatal care unit of Dr. Soetomo Hospital between January 2010 to June 2010 with purposive sampling. Descriptive analysis of risk factor of sepsis and blood culture of the patient was calculated. Chi-square analysis was performed in the laboratorium data. Characteristics sample: male vs female 61% vs 39%, outcome of sepsis in LBW was death 69%, alive 25%, risk of infection: turbid amniotic fluid 21%, asphyxia 33%. Laboratorium data leucopenia and thrombocytopenia ($P < 0.05$). Blood culture: Klebsiella pnemoniae. The incidence and mortality of neonatal sepsis in LBW infants was still high. Asphyxia, turbid amniotic fluid, leucopenia and thrombocytopenia were associated with sepsis. pneumoniae was the most common organisms in the LBW sepsis infants.

Keywords: *Neonatal sepsis, low birth weight, premature*

INTRODUCTION

Infections of the newborn and young infant are a significant cause of mortality and long term morbidity. Preterm infant have a high risk sepsis and its sequelae. In United State showed that incidence of early onset sepsis in VLBW infants was 1.5% and that of late-onset sepsis was 25%.[1,2] Neonatal sepsis, sepsis neonatorum or neonatal septicemia is a clinical syndrome characterized by sistemic signs of infection and accompanied by bacteremia in the first month of life.[1,3]

The incidence of neonatal sepsis is approximately 1 to 10 cases per 1000 live births and 1 per 250 live premature births [1] The incidence rates of neonatal infection in several referral hospitals in Indonesia is approximately 8.76%–30.29% with the mortality rate is 11.56%–49.9%. The incidence rates of neonatal sepsis in several referrals hospital in Indonesia is 1.5%–3.72% with the mortality rate is 37.09%–80%.[3]

Some conditions had been identified as risk faktor for developing a neonatal sepsis. These conditions are:[3]

1. Maternal risk factors are premature rupture of membranes (especially more than 18 hours), infection and fever of the mother during labour, foul smell of amniotic fluid, turbidity and greenish amniotic fluid, and multiple gestation.
2. Neonatal risk factors are prematurity, low birth weight, asphyxia, resuscitation during delivery, invasive procedure, congenital anomaly, parenteral nutrition, long hospital stay in neonatal intensive care unit.
3. Other risk factors: more frequently found in male than female, in black neonate, and in low social economy neonate.

Attack rates of neonatal sepsis increase significantly in low birth weight infants and the presence of maternal (obstetric) risk factor or sign of chorioamnionitis such as prolonged rupture of membranes, maternal intrapartum fever (>37.5° C). Host risk factors include male sex, developmental or congenital immune defect, congenital anomalies, omphalitis and twinning. Prematurity is a risk factor for both early onset and late onset sepsis.[1,2–4] In the Collaborative Perinatal Research Study sponsored by the National Institutes of Health, low birth weight infants acquired sepsis three times more frequently than did term infant who weighed more than 2500 gram.[4]

The purpose of this study was to describe the characteristics of neonatal sepsis in the low birth weight infant who were delivered or referred in the neonatal intensive care unit Dr. Soetomo Hospital between January 2010–June 2010

METHODS

The study design was retrospective analysis. The data were collected from the medical record of low birth weight infants who were diagnosed as sepsis and delivered or admitted in neonatal care unit of Dr. Soetomo Hospital between January 2010 to June 2010. Technical sampling was purposive sampling. We reviewed data of all infants who had been diagnosed as sepsis and collected the data of samples characterisic such as sex, referral case, mode of delivery, birth weight, gestational age, and outcome. The risk factors that associated with sepsis such as maternal fever, premature rupture of the membrane, turbid amniotic fluid, and asphyxia were documented. The laboratorium data such as hemoglobin, WBC, platelet count, CRP, and blood culture were also recorded.

Definitions

- Premature are liveborn infants delivered before 37 weeks from the first day of the last menstrual period
- Low birth weight infant are considered if infant who weight between 1,500 gram to 2,499 gram at birth.
- Very low birth weight infant are considered if infant who weight between 1,000 gram to 1,499 gram at birth
- Extremely low birth weight infant are considered if infant who weight less than 1,000 gram at birth
- Premature rupture of membrane is defined as the time from membrane rupture to onset of delivery was more than 18 hour.
- Maternal fever if mother suffered from fever which temperature > 37.5° C during delivery.
- Asphyxia is defined as apgar score in 5 minute is 3 or less
- Diagnosis of sepsis neonatorum based on clinical findings and supported by laboratory data (routine blood examination, value of C reactive protein and culture).
- Anemia is defined as hemoglobine less than 13 g/dl
- Leucopenia if the WBC less than 4,000/cmm
- Leucositosis if the WBC more than 34,000/cmm
- Thrombocytopenia if the platelets less than 100,000/cmm

Statitical analysis

Data are presented in distribution tabulation and data analysis was performed with a computer assisted statistical package (SPSS ver. 12.0). Descriptive analysis of risk factor of sepsis, laboratorium data and blood culture of the patient was calculated. Chi-square analysis was performed in the laboratorium data.

RESULTS AND DISCUSSION

Data from January 2010 until June 2010 revealed the low birth weight infant were 113 patient from total of 337 patient that admitted. Diagnosis of sepsis in LBW infant were 36 (32% of LBW patient). The characteristics of the sample are listed in table 1.

Table 1. Characteristic of low birth weight neonate

Patient charateristics		Sepsis (n = 36)	Non-sepsis (n = 77)
Sex	male	22 (61%)	40 (52%)
	female	14 (39%)	37 (48%)
Location of delivery	Dr. Soetomo	28 (78%)	71 (92%)
	Referral	8 (22%)	6 (8%)
Mode of delivery	Spontaneous	16 (44%)	46 (61%)
	Spontaneous Bracht	4 (11%)	3 (4%)
	Manual aid	1 (3%)	4 (5%)
	Vaccum extraction	1 (3%)	0 (0%)
	Forceps extraction	0 (0%)	1 (1%)
	Caesarian section	13 (36%)	22 (29%)
	Partus precipitatus	1 (3%)	0 (0%)
Birth weight	< 1000 g	4 (11%)	7 (9%)
	1000–1499 g	6 (17%)	11 (14%)
	1500–1749 g	12 (33%)	10 (13%)
	1750–1999 g	6 (17%)	10 (13%)
	2000–2499 g	8 (22%)	39 (51%)
Gestational age	< 28 weeks	2 (6%)	9 (82%)
	29–32 weeks	14 (39%)	12 (16%)
	33–36 weeks	12 (33%)	25 (33%)
	37–42 weeks	8 (22%)	29 (37%)
	> 42 weeks	0 (0%)	2 (2%)
Outcome	Alive	9 (25%)	41 (53%)
	Death	25 (69%)	24 (31%)
	Discharge on request	2 (6%)	12 (16%)

From table 1, in this study showed male infants were more suffered from neonatal sepsis, approximately 61% cases than female infants (39%) A predominance of male infant is apparent in almost all studies of sepsis in the newborn infant and the previous study in Dr Soetomo General Hospital but not among infants infected in utero.[4,5]

The usual male predominance in neonatal sepsis has suggested the possibility of a sex–linked factor in host susceptibility. A gene located in X chromosome and involved with function of the thymus or with synthesis of immunoglobulins has been postuled.[4,6] The female has

double the number of genes affecting these factors and thus might possess a greater resistance to infection. The immunologic basis for the superior survival of the female is reviewed by Purtillo and Sullivan.[7]

In the LBW sepsis group, the mode of delivery that frequently seen were spontaneous delivery (44%) and caesarian section (36%). This frequency of mode delivery in low birth infants was similar with the previous study.[8] The spontaneous delivery of LBW and premature infant usually is waited for some hours to make the maturity of the lung by giving glucocorticoid to the mother but the other consequences is increasing the risk of infection from prematur rupture of the membrane.[9] Caesarian section may contribute the changes of normal flora in infant. The caesarian section infant have lower isolation rate of bifidobacteria and a much lower incidence of *Bacteroides* spp.[10] But from the other study showed there was no significant difference in the bowel flora between mode of delivery and feeding method in the seven day postnatally.[11] The normal flora in infants have a role in the immunity system of the infant so the changes in the normal flora normal may lead to risk of sepsis condition.

The sepsis in low birth weight infants in this study was 32% with mortality 69%. This condition is similar with the previous study done by Simiyu, that incidence of sepsis in LBW was 37% with mortality 76%.[8] The LBW infant and prematurity can increased the risk of sepsis by relatively immunodeficiency and may got some invasive, monitoring procedure, and longer duration of stay that may lead to nosocomial infection.[12,13]

The mortality of LBW infants with sepsis in this study was 69%, thas was similar with the previous study that mortality in the sepsis LBW was 76%.[8] But in other study lower (46%).[14] Some condition that may contribute to the mortality of low birth weight infants are hypothermia, hypoglycemia, overcrowding and understaffing in NICU and apneic attacks beside the sepsis condition,[8,14] but in this study the condition was not determined yet.

Table 2. Risk factors of sepsis in LBW infants

Risk factors	Sepsis	Non-Sepsis
Maternal fever	0 (0%)	1 (1%)
PRM > 18 hours	2 (6%)	5 (7%)
Turbid amniotic fluid	7 (21%)	7 (9%)
Asphyxia	11 (33%)	11 (15%)

From table 2, showed that risk factor of sepsis in LBW were turbid amniotic fluid (21%) and asphyxia (33%). The turbid amniotic fluid can be caused by inflammation recation of infection in the choriamnionitis especially if it combined with foul smelling.[1] From other study showe that meconeal or turbid amniontic fluid can increased the risk of infection. The chorioamnionitis was also involved in 28% of infection in LBW.[13,15]

In the asphyxia condition, the LBW infant was got the invasive procedure i.e resuscitation, intubation or prolonged of stay during stabilization.[9] This condition can increase the risk of infection especially in the LBW infants[3] But from the previous study in Dr. Soetomo hospital showed no significant of asphyxia as risk of infection[16] In this study showed that asphyxia was found in 33% cases of sepsis in LBW, but we didn't determined the risk of asphyxia in this study.

Table 3. Laboratorium data of sepsis in LBW infants

Laboratorium data	Sepsis	Non sepsis	P value
Anemia	10 (28%)	5 (17%)	0.38
Leucopenia	8 (22%)	0 (0%)	0.006*
Leucocytosis	5 (14%)	3 (10%)	0.719
Thrombocytopenia	14 (42%)	4 (13%)	0.015*
Positive CRP	11 (48%)	8 (38%)	0.565

In the table 3 indicated that leucopenia and thrombocytopenia were significantly correlated with sepsis. Leucopenia in this study was higher than previous study.[5] Leucopenia condition was included in the scoring of sepsis to predict positive bacterial culture and correlated with the presence of bacterial infection.[2,3]

Thrombocytopenia in sepsis can be caused by direct toxic injury to platelet and may be involved with immune mechanism.[17] In this study from table 3 showed that thrombocytopenia was correlated with sepsis in LBW with p 0.015. Thrombocytopenia in sepsis neonates was also found in the previous study and usually associated with gram negative or candida sepsis.[18,19]

Table 4. Result of blood culture

Blood culture	Microorganism	
Positive	Klebsiella pnemonia	3
	Acinetobacter spp	1
	Candida spp	1
Sterile		5
	Total	10

In this study, there were 10 (27%) patient from 36 LBW-sepsis infants was obtained blood culture examination . Blood culture should be done in the presence of suspected sespsis, but some condition may interfere this procedure such as, financial problem, antibiotic was already given, no media culture ready in the unit, and transportation of media culture to the microbiology. Blood culture in the other study was less than in our study (only 14% blood culture done in the suspected sepsis patients)[8] Klebsiella pnemoniae Klebsiella pnemoniae was the most common organism in this study and the sterile culture was found in 50% of the LBW sepsis infants. From previous study showed that Klebsiella pnemoniae was as most common organism with high case fatality.[21,22]

CONCLUSIONS

The incidence and mortality of neonatal sepsis in LBW infants was still high. Some condition that associated with sepsis were asphyxia, turbid amniotic fluid, leucopenia and thrombocytopenia. Klebsiella pnemonia was the most common organisms in the LBW sepsis infants.

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