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The Profile of Hospitalized Patients with Low Birth Weight Infants at RSUP Dr. M. Djamil Padang in 2018-2020



Ranny Shabrina¹, Yuniar Lestari², Ulfa Farrah Lisa³

^{1,3}Undergraduate Midwifery Study Program, Faculty of Medicine, Andalas University Padang, Indonesia

²Department of Public Health Sciences, Faculty of Medicine, Andalas University Padang, Indonesia

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Abstract

Low Birth Weight (LBW) infants is the highest cause of neonatal death in Indonesia. LBW deaths are related to the baby's outcome which worsens his condition. LBW is grouped based on birth weight into LBW (1500-2499 grams), VLBW (1000-1499 grams), ELBW (<1000 grams), and each group shows a different neonatal outcome. This study aims to look at the profile of the group of low birth weight babies who are hospitalized at RSUP Dr.M.Djamil Padang. This research was a descriptive study by collecting medical record data from January 2018-December 2020. The data collection used total sampling 181 patients which were obtained and analyzed univariately. The results showed that out of 181 babies, 39.8% LBW, 37% VLBW, and 23.2% ELBW were found. Preterm gestational age is mostly in LBW (38.5%). Appropriate for Gestational Age (AGA) condition were mostly in VLBW (43.2%). APGAR scores at the 5th minute were normal mostly in LBW (48.3%). The most common comorbidity in LBW was hyperbilirubinemia (44.2%), in VLBW it was respiratory distress syndrome (45.1%), and in ELBW it was asphyxia (57.7%). Most NICU care was for VLBW (41.9%). Maternal breast milk combined with formula milk is the most common for LBW (49.3%). Most of the length of stay was 8-28 days for LBW (53.3%). Discharge from the hospital with a doctor's permission was mostly found in LBW (57.1%). Low birth weight babies were dominated by preterm gestational age, born at AGA, normal 5th minute APGAR score, had comorbid hyperbilirubinemia, received NICU care, received breastfeeding nutrition, had length of stay for 8-28 days, and discharged from the hospital with a doctor's permission.

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✉Correspondence Address:

Andalas University Padang – West Sumatra, Indonesia

Email : rannyshabrina@gmail.com

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INTRODUCTION

Low birth weight babies (LBW) are babies with a birth weight of less than 2500 grams regardless of gestational age. LBW has become the highest cause of neonatal deaths throughout the world from year to year with the number of deaths accounting for 60-80% of neonatal deaths (UNICEF, 2019). In 2020, the annual average rate of decline in LBW globally did not progress significantly or even progressed slowly (UNICEF, 2023). Based on data from the Ministry of Health of the Republic of Indonesia in 2020, most neonatal deaths were caused by LBW conditions (35.2%). Data from the West Sumatra Provincial Health Service in 2020 shows that the LBW incidence rate was 3.3% of 109,431 live births and LBW contributed 21.6% of LBW deaths from 779 neonatal deaths. Based on birth weight, LBW babies are divided into 3 groups, namely Low Birth Weight Babies (LBW) with a birth weight of 1500-2500 grams, Very Low Birth Weight Babies (VLBW) with a birth weight of 1000-1500 grams, and Extremely Low Birth Weight Babies (ELBW) with a birth weight of less than 1000 grams (WHO, 2016). This division of LBW shows different neonatal outcomes in each group and the lower the birth weight, the higher the risk of death and complications experienced (Habib et al., 2022; Singh et al., 2021). LBW can be born at any gestational age, including preterm (less than 37 weeks) and term (37-42 weeks). The majority of LBW are found at preterm gestational age (Afian et al., 2021). Immediate postnatal assessment using APGAR scores is used to confirm survival and predict adverse outcomes in the neonatal period. LBW tend to have lower APGAR scores than normal birth weight babies (Li et al., 2013).

Mortality in low birth weight babies differs significantly in each birth weight category, and the risk of death is inversely proportional to birth weight (Habib et al., 2022). The high risk of death in low birth weight babies can be caused by accompanying complications such as hypothermia, hypoglycemia, asphyxia, respiratory distress syndrome, sepsis, hyperbilirubinemia, necrotizing enterocolitis, congenital abnormalities, and neonatal pneumonia (Habib et al., 2022; Kumar et al., 2020; Singh et al., 2021). Treatment for low birth weight babies in each birth weight category is determined based on the stability of the baby and complications or difficulties. Babies with complications and critical conditions

require intensive care in the Neonatal Intensive Care Unit (NICU) to receive special treatment and care (AAP & ACOG, 2017). Research by Cetin in Turkey showed that 66.2% of low birth weight babies received NICU care and the rest did not receive NICU care (Çetin et al., 2019). Length of stay in LBW patients can be predicted from birth weight, comorbidities, and reason for discharge from hospital (Behera et al., 2020; Kiatchoosakun et al., 2022; Singh et al., 2021). The high rate of neonatal mortality caused by LBW and the higher risk of death at lower birth weight means researchers are interested in looking at the factors that influence the condition of LBW after birth based on birth weight. Currently, data regarding the profile of LBW in Indonesia, especially in West Sumatra is still not widely available and RSUP Dr. M. Djamil Padang as the main referral hospital on the central part of Sumatra Island which serves maternal and neonatal emergencies requires data regarding this LBW profile.

METHODS

The type of research used in this research is descriptive to determine the profile of inpatients with low birth weight babies at RSUP Dr. M. Djamil Padang 2018-2020. The research was conducted at the medical records installation of RSUP Dr. M. Djamil Padang in 2018-2020. The data obtained included birth weight, gestational age, birth weight classification according to gestational age, 5th minute APGAR score, comorbidities, type of ward, type of nutrition, length of stay, and indication for discharge from hospital. The population in this study was 229 babies with the sample being all members of the population who met the inclusion and exclusion criteria, resulting in a total sample of 181 babies. The inclusion criteria are babies with a birth weight of less than 2500 grams who are hospitalized, while the exclusion criteria are incomplete medical record data and mothers with a confirmed history of Covid-19. This is because Covid-19 is a new disease so it cannot be ascertained the effect of a mother who is confirmed to have Covid-19 during pregnancy on the baby she gives birth to. After the data is obtained, each variable will be analyzed descriptively which will then be processed and presented in the form of frequency tables, percentage calculations and narratives.

RESULTS

From the research results, the 181 samples obtained were then categorized based on their birth weight groups, namely 72 LBW, 67 VLBW, and 42 ELBW. The results of this study present the number and percentage of the LBW group for each variable in the form of gestational age, gestational age according to birth weight, 5th minute Apgar score, comorbidities, type of treatment room, type of nutrition during treatment, length of stay, and indication for discharge. hospital. This is shown in table 1.

Table 1 Frequency distribution of low birth weight babies based on variables

Variable	LBW n (%)	VLBW n (%)	ELBW n (%)	Total n (%)
1. Gestational Age				
Preterm	62 (36.7)	65 (38.5)	42 (24.8)	169 (100)
Aterm	10 (83.3)	2 (16.7)	0	12 (100)
Posterm	0	0	0	0
2. Birth weight by gestational age				
Small for Gestational Age (SGA)	11 (26.8)	16 (39.0)	14 (34.1)	41 (100)
Appropriate for Gestational Age (AGA)	60 (43.2)	51 (36.7)	28 (20.1)	139 (100)
Large for Gestational Age (LGA)	1 (100)	0	0	1 (100)
3. 5th minute APGAR score				
0-3	1 (10.0)	1 (10)	8 (80.0)	10 (100)
4-6	2 (7.1)	13 (46.4)	13 (46.4)	28 (100)
7-10	69 (48.3)	53 (37.1)	21 (14.7)	143 (100)
4. Major Comorbidities				
There isn't any	2 (66.7)	0	1 (33.3)	3 (100)
Hypothermi	16 (32.7)	14 (28.6)	19 (38.8)	49 (100)
Hypoglycemia	4 (26.7)	6 (40.0)	5 (33.3)	15 (100)
Asphyxia	8 (15.4)	14 (26.9)	30 (57.7)	52 (100)
Respiratory Distress Syndrome	30 (27.5)	48 (44.0)	31 (28.4)	109 (100)
Pneumonia Neonatal	5 (20.8)	17 (70.8)	2 (8.3)	24 (100)
Sepsis	17 (29.8)	27 (47.4)	13 (22.8)	57 (100)
NEC (Necrotizing Enterocolitis)	1 (8.3)	6 (50.0)	5 (41.7)	12 (100)
Hyperbilirubinemia	61 (45.9)	53 (39.8)	19 (14.3)	133 (100)
Congenital Abnormalities	7 (46.7)	7 (46.7)	1 (6.7)	15 (100)
5. Others Comorbidities				
Respiratory disorders	15 (31.3)	23 (47.9)	10 (20.0)	48 (100)
Other infections	0	2 (100)	0	2 (100)
Hematological disorders	13 (18.1)	33 (45.8)	26 (36.1)	72 (100)
Electrolyte disorders	6 (11.1)	25 (46.3)	23 (42.6)	54 (100)
Digestive disorders	1 (33.3)	1 (33.3)	1 (33.3)	3 (100)
Endocrine disorders	5 (13.2)	19 (50.0)	14 (36.8)	38 (100)
Nervous disorders	2 (50)	2 (50.0)	0	4 (100)
Other	7 (25.9)	9 (33.3)	11 (40.7)	27 (100)
6. Type of Treatment Room				
NICU	52 (34.7)	62 (41.3)	36 (24.0)	150 (100)
Not NICU				
Special Care Nursery (SCN)	17 (77.3)	5 (22.7)	0	22 (100)
Rooming in	3 (100)	0	0	3 (100)
Not specified	0	0	6 (100)	6 (100)

Variable	LBW n (%)	VLBW n (%)	ELBW n (%)	Total n (%)
7. Types of Nutrition				
Breast milk				
Only breast milk	31 (49.2)	21 (33.3)	11 (17.5)	63 (100)
Breast milk + Human Milk Fortifier (HMF)	2 (11.1)	14 (77.8)	2 (11.1)	18 (100)
Breast milk + formula milk	37 (49.3)	28 (37.3)	10 (13.3)	75 (100)
Non breast milk				
Formula milk	2 (66.7)	1 (33.3)	0	3 (100)
Fasting	0	2 (13.6)	19 (86.4)	22 (100)
8. Length of hospitalization				
<24 jam	0	0	6 (100)	6 (100)
1-7 days	22 (38.6)	13 (22.8)	22 (38.6)	57 (100)
8-28 days	48 (53.3)	35 (38.9)	7 (7.8)	90 (100)
>28 days	2 (7.1)	19 (67.9)	7 (25.0)	28 (100)
9. Indication for discharge from the hospital				
Doctor's permission	60 (57.1)	38 (36.2)	7 (6.7)	105(100)
Forced discharge patients	10 (40.0)	10 (40.0)	5 (20.0)	25 (100)
Death	2 (3.9)	19 (37.3)	30 (58.8)	51 (100)

* some babies have more than 1 comorbidity

The results of this study showed that the most patients with low birth weight babies had a preterm gestational age, namely 169 patients (93.4%). In the birth weight variable according to gestational age, 139 patients (76.8%) of low birth weight babies were born appropriate for gestational age (AGA), and in each group there were also dominated by AGA births. The 5th minute APGAR score was most often found in normal score (score 7 to 10), namely 143 babies (79%). The main comorbidities hyperbilirubinemia, respiratory distress syndrome, sepsis and asphyxia are the most common diseases found in patients with low birth weight babies. Hyperbilirubinemia is the most common comorbidity found in patients with low birth weight babies, with the highest distribution in the LBW group (44.2%). Most patients with low birth weight babies received treatment in the NICU compared to those who did not, with the largest distribution by the VLBW group (41.9%). More patients with low birth weight babies receive breast milk nutrition compared to non-breast milk babies. Most nutrition is provided in the form of breast milk combined with formula milk, with the highest distribution being LBW (49.3%) The VLBW group had a longer average length of stay (67,9%) compared to the LBW and ELBW groups. A total of 105 patients (58%) of low birth weight babies were discharged from the hospital after receiving doctor's approval, either in recovered or improved condition. The LBW group had the highest percentage of indications for discharge from hospital with the doctor's permission among the other groups.

DISCUSSION

Gestational Age

Based on the research results presented in table 1, it was found that the majority of patients with low birth weight babies were born at preterm gestational age, namely 169 patients (93.4%). Similar results were found from research by Afian et al. (2021) which found that most low birth weight babies had a preterm gestational age. This research also shows that gestational age is directly proportional to birth weight. It can be seen that the ELBW group were all born preterm, then the VLBW and LBW were dominated by preterm gestational age. Based on theory, the fetus weighs around 2500 grams at 36 weeks of gestation and will continue to increase until it reaches 3400 grams at 40 weeks of gestation.

Babies born before 37 weeks of gestation will tend to experience low birth weight due to reduced fetal growth and development (Cunningham et al., 2022: 783).

Birth Weight by Gestational Age

In terms of birth weight according to gestational age, the results of this study showed that 139 patients (76.8%) of low birth weight babies were born appropriate for gestational age (AGA), and in each group also showed that AGA births dominated. Research by Rasania et al. (2018) showed similar results, namely the percentage of low birth weight babies born in AGA was 82.7%. AGA babies are defined as babies with a birth weight for gestational age that is between the 10th percentile to the 90th

percentile of the Lubchenco curve. Low birth weight babies born to AGA show normal intrauterine growth, but babies are born with low birth weight due to delivery at preterm gestational age. Preterm birth results in a reduction in the intrauterine growth period so that babies born experience organ immaturity and are at risk of many diseases (Leksomono et al., 2019).

5th minute APGAR score

The results of this study showed that 143 babies (79%) had normal APGAR scores (7 to 10) at the 5th minute. In line with research by Woelile et al. (2021) which found 75.7% of low birth weight babies had normal APGAR scores at the 5th minute. In newborn babies, the 5th minute APGAR value shows more clinical results compared to the first minute. This is because the APGAR score in the first minute often shows lower results and is temporary as a form of adaptation to the birth process, so that a re-assessment at the 5th minute shows how far the baby's ability to adapt to its new environment (Razaz et al., 2019). A low 5-minute APGAR value also has greater predictive value for neonatal death and adverse neurological risk (Chilipio-Chiclla et al., 2021). This research shows that 5th minute APGAR scores of less than 7 are more common in ELBW compared to VLBW and LBW. The lower the birth weight, the higher the risk of having an APGAR score of less than 7 at the 5th minute. This is because the gestational age and maturity of the baby can influence the APGAR score (Li et al., 2013).

Neonatal comorbidity

The most common comorbidity found in research is hyperbilirubinemia. Hyperbilirubinemia is the most common comorbidity found in patients with low birth weight babies, with the highest distribution in the LBW group (44.2%). Research by Habib et al. (2022) also found that low birth weight babies with hyperbilirubinemia had a high percentage, especially in the LBW group, namely 85.7% and 51% respectively. Hyperbilirubinemia is a condition when the bilirubin level in the body exceeds 5mg/dL, which is accompanied by the clinical appearance of yellow coloring on the skin, sclera or mucous membranes as a result of excessive bilirubin accumulation in the tissue (Kosim et al., 2014: 147).

The next comorbidity frequently experienced by low birth weight babies in this study was Respiratory Distress Syndrome (RDS), with the highest distribution in VLBW (45.1%). Several previous

studies also found that the percentage of VLBW accompanied by respiratory distress syndrome was quite high (Kiatchoosakun et al., 2022; Singh et al., 2021). The high risk of RDS disease is because low birth weight babies tend to be born preterm so that the baby's lungs are immature and the surfactant produced is not sufficient for the lungs to breathe properly (Kosim et al., 2014: 126).

Sepsis in this study was found in 61 babies with the highest distribution in the VLBW group (49.2%). This figure is greater than that found by Habib et al. (2022), namely 25.9% and 26.5% respectively. Low birth weight babies, especially premature babies, are more susceptible to sepsis because of the lack of antibody levels in babies which function as protection against specific infections (Woelile et al., 2021).

Asphyxia in this study was most often found in ELBW (57.7%). Several previous studies found low birth weight babies accompanied by asphyxia with a lower incidence compared to this study (Kebede et al., 2022; Kumar et al., 2020). Asphyxia is a condition when a baby fails to breathe spontaneously during the intrauterine to extrauterine transition period which is caused by disruption of oxygen flow from the placenta to the fetus resulting in less oxygen perfusion to the tissues and causing damage to various organs such as the brain, heart, lungs, liver, kidneys and gastrointestinal tract (Gillam-Krakauer & Gowen Jr, 2023). Low birth weight babies who are premature tend to experience more severe oxygen perfusion disorders due to less than optimal redistribution of the baby's blood flow and brain immaturity which is related to the lack of availability of antioxidants to detoxify accumulated free radicals. Resuscitation is carried out as a treatment for asphyxia at birth with the aim of improving the respiratory and heart function of a baby who is not breathing to prevent death and further complications (Kosim et al., 2014: 104).

Type of treatment room

The results of this study show that most patients with low birth weight babies received treatment in the NICU compared to those who did not, with the largest distribution by the VLBW group (41.9%). In line with research by Çetin et al. (2019) which showed that the majority (66.2%) of low birth weight babies received treatment in the NICU compared to those who did not. NICU care aims to provide special care and treatment to prevent vital organ failure in babies. Low birth weight babies, especially the VLBW and ELBW

groups, are at risk of having critical conditions and experiencing various diseases, this is because the lower the baby's birth weight, the less perfect their organ maturity is (Woelile et al., 2021). Without a forced discharge during treatment, low birth weight babies who receive NICU care have a higher chance of survival compared to those who are not treated in the NICU (Kebede et al., 2022; Kiatchoosakun et al., 2022). In this study, a total of 22 patients (12.2%) low birth weight babies did not receive NICU treatment but were treated in *Special Care Nursery* (SCN), namely a treatment room intended for babies with illnesses but who do not require intensive supervision. As many as 6 ELBW patients in the study had not been assigned treatment rooms because the babies died less than 1 hour after birth.

Types of nutrition

This research shows that more patients with low birth weight babies receive breast milk nutrition compared to those who do not receive breast milk. Most nutrition is provided in the form of breast milk combined with formula milk, with the highest distribution being LBW (49.3%). This research is similar to research by Hendrarto et al. (2020) which shows that the majority of low birth weight babies receive breast milk nutrition, of which 39.1% of babies receive breast milk and formula milk, 25.8% of babies receive only breast milk, and 12, 5% of babies received breast milk and Human Milk Fortified (HMF). Providing nutrition in the form of only breast milk or breast milk combined with formula milk or HMF has been proven to increase the weight of low birth weight babies, especially premature babies (Abiramalatha et al., 2021; Juharji et al., 2022). In this study, 22 babies were fasted during treatment with 86.4% of them being ELBW. ELBW who did not receive breast milk or were fasted in this study were babies who died in less than 7 days. Fasting for several days has been shown to induce mucosal atrophy, reduce the secretion of intestinal hormones and enzymes, and damage mucosal immunity in infants. Therefore, babies who have disease within 1 week of birth must still be given nutrition, even in small amounts, to stimulate the development of the digestive tract without aggravating the degree of disease (Abiramalatha et al., 2021).

Length of Hospitalization

The results of this study show that low birth weight babies most often require a hospital stay of 8-28 days, especially in the LBW group. The lower the

birth weight, the lower the ability to survive, as in VLBW and ELBW. Length of hospitalization is influenced by birth weight, gestational age, and accompanying diseases (Behera et al., 2020; Kiatchoosakun et al., 2022; Singh et al., 2021). VLBW has better survival capabilities than ELBW, and when both groups of babies are accompanied by diseases that can cause death, the ELBW group will tend to die earlier than VLBW (Singh et al., 2021).

Regarding mortality rates, this research shows that the low birth weight babies mortality rate is inversely proportional to birth weight. The lower the birth weight, the higher the risk of death, the percentage of death rates during hospitalization are ELBW (58.8%), VLBW (37.3%), and LBW (3.9%), but this study did not look at the causes of death in low birth weight babies so the causes of death could not be analyzed. ELBW is the group of babies most at risk of death and disease and therefore requires intensive care in hospital to prevent death, however the results of this study show ELBW have the highest percentage with a length of stay of less than 7 days. A total of 6 ELBW were treated in less than 24 hours, of which 5 babies died and 1 other baby was forced to go home. Likewise, 22 patients (38.6%) with ELBW were treated within 1 to 7 days, 19 of the babies died and 3 other babies were forced discharge. This shows the high risk of ELBW death within 7 days of birth, as reported by Kiatchoosakun et al. (2022) that the ELBW death rate within 7 days of birth is 56.9%, and ELBW who are able to survive have a treatment time of around 47 up to 94 days.

Indication of Discharge from Hospital

Based on the research results, it was found that 105 patients (58%) of low birth weight babies were discharged from the hospital after receiving doctor's approval, both in recovery and in improved condition. The LBW group had the highest percentage of indications for discharge from hospital with the doctor's approval among the other groups. These results are in line with research by Rasania et al. (2018) which shows LBW as the group that has the highest percentage of hospital discharge with doctor's approval, namely 97%. Low birth weight babies require hospital treatment until their medical condition is stable and accompanying illnesses are declared cured. Babies forced discharge before treatment is completed there is a risk of death and readmission to hospital (Oluwafemi et al., 2022).

This study shows an increase in mortality rates at lower birth weights, which is highest at ELBW (58.8%). This is in line with other research which

found that the highest mortality of low birth weight babies was experienced by the ELBW group (Woelile et al., 2021). The high risk of death of low birth weight babies can be related to the maturity level of the baby and accompanying diseases. Low birth weight babies are often found in old age preterm which shows that the maturity of the baby's organs is not optimal and simultaneously the baby is also at risk of developing diseases that can worsen the condition (Cunningham et al., 2022: 785). Previous research found that comorbid respiratory distress syndrome, asphyxia and sepsis were found to be the most common causes of death in low birth weight babies (Kebede et al., 2022; Kiatchoosakun et al., 2022; Singh et al., 2021). In this study, it cannot be ascertained which type of comorbidity is most at risk of causing death because each baby has varying types and numbers of comorbidities.

CONCLUSION

Low birth weight babies are also dominated by gestational age preterm, was born in AGA, the 5th minute normal APGAR score, had a comorbidity of hyperbilirubinemia, received NICU care, received breast milk nutrition, had a length of stay of 8-28 days, and was discharged from the hospital with the doctor's permission.

SUGGESTION

Midwives and doctors are expected to always increase efforts for early detection of pregnant women who are at risk of giving birth to premature babies and low birth weight by maximizing pregnancy health checks.

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CONFLICTS OF INTEREST

The authors state that there are no conflicts of interest in this research.

AUTHOR CONTRIBUTIONS

In this research, the author as a correspondent who is responsible for the research process from conception to publication by writing articles that have been adapted to journal guidelines.

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