ECRONICON OPEN ACCESS

EC PAEDIATRICS
Research Article

Prevalence of Anemia in Newborns According to Birth Weight and Gestational Age at RSUP Dr. Hasan Sadikin Bandung in 2018

Ikhlashil Asfarina*, Merry Wijaya and Fiva Aprilia Kadi

Faculty of Medicine, Padjadjaran University, Sumedang, Indonesia

***Corresponding Author:** Ikhlashil Asfarina, Faculty of Medicine, Padjadjaran University, Sumedang, Indonesia.

Received: May 12, 2021; **Published:** January 31, 2023

Abstract

Background: Anemia in newborns can disrupt growth and development of infants and affect cardiorespiratory system which can cause death in infants. Research on prevalence of anemia in newborns according to birth weight and gestational age in Indonesia is still very rare.

Objective: Knowing the prevalence of anemia in newborns based on birth weight and gestational age.

Methods: Descriptive research with a cross-sectional method using secondary data from Neonatology Division Registration System Department of Children's Health RSUP DR. Hasan Sadikin Bandung. The inclusion criteria of this study were infants born alive at RSUP Dr. Hasan Sadikin Bandung in the period 1 January 2018 to 31 December 2018. The exclusion criteria for this study were incomplete medical records, which could be deleted or inaccessible. Gestational age, baby's birth weight and anemia status were approved by looking at hemoglobin levels that were included in the medical record.

Result: A total of 1494 newborns according to inclusion and exclusion criteria. The results showed that 14.5% of newborns had anemia. The results of the analysis of anemia status based on birth weight and age showed 79.2% of patients born with low birth weight and 75.9% of patients born prematurely.

Conclusion: The prevalence of anemia in low birth weight and premature is low compared to normal and full term baby.

Keywords: *Anemia; Low Birth Weight Infant; Premature*

Introduction

Anemia is a hematological disorder that often occurs in newborns [1]. Definition of anemia is a condition of hemoglobin below normal according to gender and age [2]. The average normal hemoglobin level in infants born at term is 17 g/dL [3]. Babies born prematurely with a weight of 1200 - 2500 grams have a much lower hemoglobin and hematocrit concentration compared to term infants [4]. This is because LBW and premature babies have immature organ maturation so that it can cause dysfunction in organs and body systems [5]. Dysfunction can occur in infants. respiratory system, central nervous system, cardiovascular, haematological, gastrointestinal, renal, and also thermoregulation [6]. One of the common dysfunctions in premature birth is the hematological system [7]. Abnormalities of the he-

matological system result in hemoglobin levels of newborns with low birth weight and/or LBW conditions. or premature birth ranging from 14 - 20 g/dL. Newborns can be called anemic if the hemoglobin level is below 14 g/dL [8].

Anemia if left untreated for a long period of time can lead to dangerous complications. One of the problems that arise is in the heart, such as a fast and irregular heartbeat. This condition can progress to cardiomegaly or heart failure. Long-term complications that occur in infants with anemia are growth disorders, in addition, infants with a history of anemia tend to be susceptible to infection. Therefore, early treatment is needed for premature and low birth weight babies. As many as 60 - 80% of premature infants with anemia in the United States require at least one blood transfusion [4]. The Indonesian Pediatric Association recommends giving iron supplementation of at least 2 mg/kg/day from 1 month to 12 months of age for infants born prematurely or LBW [9].

The prevalence of anemia in the world in children aged 0 - 5 years is 47.4% [10]. The study reported that the prevalence of anemia was 26.5% of 310 premature babies born with low birth weight [11]. Half of infants born with gestational age less than 32 weeks will experience neonatal anemia. Neonatal anemia usually occurs in premature and low birth weight infants. Other conditions that often cause neonatal anemia include low erythropoietin (EPO) production, short red blood cell lifespan, and blood loss [7]. Signs and symptoms of neonatal anemia in infants that are common include paleness, poor weight gain despite adequate intake of food. good calories, reduced activity, and difficult to feed orally [4].

The researcher chose the location at RSUP Dr. Hasan Sadikin (RSHS) Bandung because RSHS is a third-level health facility which is the main reference for health facilities in West Java and even nationally.

Purpose of the Study

The purpose of this study was to determine the prevalence of anemia in newborns at Dr Hasan Sadikin Hospital, Bandung, West Java. It is hoped that it can help provide information to medical personnel to determine the prevalence of anemia in newborns according to birth weight and gestational age so that premature or low birth weight babies are treated quickly.

Methods

This research is a descriptive study with a cross-sectional method using secondary data from the medical records of the Neonatology Division of the Department of Pediatrics Dr. RSUP. Hasan Sadikin Bandung. The research subjects were infants born during the period January 1, 2018 to December 31, 2018. The inclusion criteria were live births. Exclusion criteria were incomplete, missing, or inaccessible medical record data. The sampling technique used was the total sampling method.

The study data included gestational age 37 - 42 weeks categorized as term gestational age and < 37 weeks categorized as preterm. Birth weight of 2500 - 4000 grams is categorized as normal birth weight and < 2500 grams is categorized as low birth weight (LBW). Anemia status was assessed if the Hb level was < 14 g/dL within 24 hours after birth. The data that has been collected was analyzed using statistical software IBM SPSS Statistics version 20.0.

The research has gone through the ethical process of the Faculty of Medicine, Padjadjaran University with number 744/UN6.KEP/EC/2019 and a research permit in accordance with the Training and Ethics Committee of Hasan Sadikin Hospital Bandung with number LB.02.01/X.2.2.1/11660/2019.

Results

The number of babies born at RSUP Dr. Hasan Sadikin Bandung for the period January 1, 2018 to December 31, 2018 as many as 3210 babies. There were 1494 babies born who met the inclusion criteria: 713 (47.7%) baby girls and 781 (52.3%) baby boys. Most newborns

had birth weight < 2500 grams (61.8%) and preterm gestational age (55.2%). The characteristics of the sample from this study are listed in table 1.

Table 1 describes the characteristics of the subjects by sex, birth weight, and gestational age. The percentage of anemia in baby girls and boys is not much different, 47.2% and 52.8%. LBW (< 2500 grams) as many as 924 infants (61.8%) with 171 infants (79.2%) experiencing anemia. Based on gestational age, it was seen that the preterm category (< 37 weeks) was 824 infants (55.2%) with 164 (75.9%) experiencing anemia.

Newborn baby	Anemia (n = 216)	Non Anemia (n = 1278)	Total (n = 1494)
Gender			
Woman	102 (7,2)	611 (7,8)	713 (47,7)
Men	114 (52,8)	667 (52,2)	781 (52,3)
Birth Weight			
Normal (>2500 gram)	45 (20,8)	525 (41,1)	570 (38,2)
BBLR (<2500 gram)	171 (79,2)	753 (58,9)	924 (61,8)
Gestational Age			
Enough month (> 37 weeks)	52 (24,1)	618 (48,4)	670 (44,8)
Less than a month (< 37 weeks)	164 (75,9)	660 (51,6)	824 (55,2)

Table 1: *Characteristics of newborns.*

Variable	Anemia	Non Anemia	Total	Mean ± SD	p value
Gender					0,87
Woman	102 (14,3)	611 (85,7)	714 (100)	17,7 ± 11,4	
Men	114 (14,6)	667 (85,4)	781 (100)	17,3 ± 6,2	
Birth Weight					0,00
Normal (2500 - 4000 gram)	45 (7,9)	525 2,1)	571 (100)	17,8 ± 6,7	
BBLR (< 2500 gram)	171 (18,5)	753 (81,5)	924 (100)	17,3 ± 10.2	
Gestational Age					0,00
Enough month (> 37 weeks)	52 (7,8)	618 (92,2)	670 (100)	17,9 ± 6,3	
Less than a month (< 37 weeks)	164 (19,9)	660 (80,1)	824 (100)	17,2 ± 10,7	
Amount	216 (14,5)	1278 (85,5)	1494 (100)	17,5 ± 9,0	

Table 2: *Test results of the relationship between research variables and anemia status.*

Based on table 2, it can be seen that in the female group, 102 infants were anemic and 611 infants were not anemic, the percentage was 14.3% with an average hemoglobin level of 17.7 ± 11.4 g/dL. In the male group, 14.6% had anemia with an average hemoglobin level of 17.3 ± 6.2 g/dL.

The average hemoglobin level of normal birth weight infants was 17.8 ± 6.7 g/dL with an anemia percentage of 7.9%. In the LBW category, there were 171 infants with anemia and 753 infants without anemia with an average hemoglobin level of 17.3 ± 10.2 g/dL, so the percentage of anemia in LBW infants was 18.5%.

The highest anemia status based on gestational age occurred in the < 37 weeks gestational age group, which was 19.9% with an average hemoglobin level of 17.2 ± 10.7 g/dL. The group at term of gestational age has a relatively small percentage of anemia, namely 7.8% with an average hemoglobin level of 17.9 ± 6.3 g/dL.

Overall, it was found that the prevalence of anemia in newborns was 14.5% with an average hemoglobin level of 17.5 ± 9.0 g/dL. The results of statistical analysis using the Chi-square comparative test in table 2 show that there is a significant relationship between gestational age and birth weight with anemia status.

Discussion

The prevalence of anemia in newborns is 14.5%; 79.2% of them were born with LBW and 75.9% of them were born with preterm gestation. Based on the prevalence of anemia in Indonesia according to WHO, the prevalence of anemia in this study is lower than the WHO prevalence of 20.0 - 39.9%. The overall prevalence of anemia compared with the study conducted by Lee., *et al*. [12] in the USA in 2015 and that conducted by Eneroth., *et al*. [13] in Bangladesh in 2011 there were significant differences, but closer to the prevalence of anemia in Beijing reported by Quinn., *et al*. [14], Lee., *et al*. found a prevalence of anemia of 21% and Eneroth., *et al*. reported a prevalence of anemia of 46% in newborns while Quinn., *et al*. [14] reported that the prevalence of anemia in newborns was 11.8%. This difference in results may occur due to differences in sample selection techniques or methods of checking Hb levels.

Anemia status at normal birth weight (2500 - 4000 grams) contained 45 babies (7.9%) of 570 newborns with normal birth weight. In LBW infants, the prevalence of anemia was 18.5%. Several studies have shown that low birth weight can increase the risk of anemia but in a study conducted in Beijing it was reported that birth weight had no effect on the incidence of anemia in newborns.

Based on the relationship between birth weight and anemia status, it was found that there was a significant relationship between birth weight and gestational age. In newborns with LBW there is a decrease in the function of the hematological system, so that there is a decrease in Hb levels in newborns with LBW [7].

Anemia status based on gestational age showed that 52 term infants were anemic (7.8%) out of a total of 670 term babies. The preterm category of anemia prevalence is 19.9%. The results of the bivariate test between gestational age and anemia status showed that gestational age in newborns had a significant relationship with anemia status.

The results of this study are in accordance with several studies which show that the more premature the baby will increase the risk of anemia. Research conducted in Beijing and the United States also reported that preterm infants had a higher prevalence than term infants [15,16].

Every newborn with preterm gestation has a risk of developing anemia. This is due to the immaturity of the organs of premature babies born that are not yet perfect, resulting in dysfunction of their body systems. One of them is in the hematological system so that the Hb level of premature babies is lower than that of term babies [5,7]. Complications of anemia in newborns can cause disturbances in the cardiorespiratory system, development and growth, and are prone to infection. Therefore, preterm infants should receive iron supplementation of at least 2 mg/kg/day.

Factors that can affect the Hb level of newborns are prevention carried out during pregnancy or before birth. Prevention that can be done includes primary and secondary prevention. Primary prevention includes education in health centers about adequate iron intake and iron supplementation for infants and mothers during pregnancy [9]. Secondary prevention includes early diagnosis of newborns. The coverage of giving blood-added tablets (TTD) to pregnant women in West Java in 2017 was 92.36%, and this figure has reached the 2017 Strategic Plan target of 90%.

This study has limitations because it does not look at maternal factors such as maternal age, maternal nutrition during pregnancy, consumption of appropriate blood supplement tablets, and routine pregnancy control.

Conclusion

The prevalence of anemia is 14.5% in newborns at RSUP Dr. Hasan Sadikin in 2018 was still relatively low compared to the prevalence of anemia in the world, but based on gestational age and birth weight the prevalence of anemia in LBW infants (18.5%) and preterm births (19.9%) was higher than normal birth weight (7.9%) and full month (7,8%). This indicates a possible relationship between birth weight and gestational age with the incidence of anemia. So, there is a need for further research on this matter.

Bibliography

1. Gomella TL. "Neonatalogy: Management, Procedure, On-Call Problems, Disease, and Drugs". 6th edition. United States: The McGraw-Hill Companies (2009).
2. K Kaushansky., *et al*. "Williams Hematology". 9th edition. McGraw-Hill Education (2015): 99-105.
3. Brian Yang Merritt. "Hemoglobin Concentration (Hb): Reference Range, Interpretation, Collection and Panels". Medscape (2014).
4. Cassady G. "Anemia of Prematurity". Medscape (2016).
5. Michalczuk M., *et al*. "An Influence of Birth Weight, Gestational Age, and Apgar Score on Pattern Visual Evoked Potentials in Children with History of Prematurity". *Neural Plasticity* (2015):1-10.
6. Kementrian Kesehatan Republik Indonesia. Profile Kesehatan Indonesia Tahun 2017. Kurniawan R, Yudianto, Hardhana B, Siswanti T, editors. Ministry of Health Indonesia. Kementerian Kesehatan Republik Indonesia (2018).
7. Lokeshwar M. "Pediatric Hematology and Hemato-Oncology". 1st edition. Shah NK, Agarwal BR, Manglani MV, Sachdeva A, editors. The Health Sciences Publisher (2016): 29-34.
8. Permono HB., *et al*. "Buku Ajar Hematologi- Onkologi Anak. ke-2, editor". Ikatan Dokter Anak Indonesia. Jakarta (2006): 24-29.
9. IDAI. Rekomendasi Suplementasi Zat Besi Untuk Anak (2011).
10. WHO Global Database on Anaemia. Worldwide prevalence of anaemia. World Heal Organ (2008).
11. Ferri C., *et al*. "Prevalence and Risk Factors for Iron-Deficiency Anemia in Very-Low-Birth-Weight Preterm Infants at 1 Year of Corrected Age". *The Journal of Tropical Pediatrics* 60.1 (2014): 53-60.
12. Lee S., *et al*. "Prevalence of anemia and associations between neonatal iron status, hepcidin, and maternal iron status among neonates born to pregnant adolescents". *Pediatric Research* 79 (2015): 42.
13. Eneroth H., *et al*. "Infant anaemia is associated with infection, low birthweight and iron deficiency in rural Bangladesh". *Acta Paediatrica* 100.2 (2011): 220-225.
14. Quinn J-A., *et al*. "Preterm Birth: Case Definition and Guidelines for Data Collection, Analysis, and Presentation of Immunisation Safety Data". *Vaccine* 34.49 (2016): 6047-6056.
15. Li Q., *et al*. "Prevalence of Anemia and Its Associated Risk Factors Among 6-Months-Old Infants in Beijing". *Frontiers in Pediatrics* 7 (2019): 286.

16. Jopling J., *et al*. "Reference ranges for hematocrit and blood hemoglobin concentration during the neonatal period: data from a multihospital health care system". *Pediatrics* 123.2 (2009): e333-e337.

Volume 12 Issue 2 February 2023