

The Effect Of Delaying Umbilical Cord Cutting On Hemoglobin Levels In Newborn Babies

Erda Restya Agustin^{1*}, Laila Lailaturohmag², Dwi Lukmawati³, Fransiska Septiana⁴
^{1,2,3,4} Lecturer of Midwifery Department, Ganesha Husada
email : erdarestiyaagustin@yahoo.com

ABSTRACT

Iron deficiency anemia, commonly occurring in infants aged 6-24 months, can be prevented by delaying the cutting of the umbilical cord after birth. A quasi-experimental study conducted at the Mother and Child Clinic in Mojo Kediri involved 30 infants, divided into an experimental group (with delayed cord clamping) and a control group. Hemoglobin levels were measured using a Hematology Autoanalyzer, and the data were analyzed using a t-test. The intervention group, with a delay in cord clamping for 1 hour, showed an average increase in Hb levels from 15.444 g/dl to 19.800 g/dl after 24 hours. Meanwhile, the control group, without any delay, increased from 15.544 g/dl to 16.844 g/dl. Delaying the umbilical cord clamping significantly increased hemoglobin levels in newborns (p-value: 0.000). Infants with delayed cord clamping exhibited higher hemoglobin levels, better body iron reserves, and reduced risk of anemia. The higher red blood cell levels supported better cardiopulmonary adaptation and increased breastfeeding duration in early life. The research concludes that delaying the cutting of the umbilical cord for 2 minutes in newborns can enhance Hb levels after 24 hours compared to cord clamping at 15 seconds after birth. This highlights the importance of delaying cord clamping to support hemoglobin health and infant development.

Keywords: Delaying Umbilical Cord Clamping, Hemoglobin Levels, Newborns

Background

Anemia due to iron deficiency in infants is a prevalent health issue in nearly all developing countries, particularly occurring between the ages of 6 to 24 months. The high prevalence of anemia in infants aged 6-9 months is associated with insufficient iron storage, leading to growth and developmental disruptions in the first 6 months of life. Postnatal factors further contribute to early decreases in iron reserves, resulting in anemia (1)

One preventive measure for iron deficiency anemia in newborns is delaying the clamping and cutting of the umbilical cord. While clamping and cutting the infant's umbilical cord at birth is a necessary intervention, the optimal timing for this procedure remains controversial. The ideal time to delay cord clamping is still debated among experts (5). This is based on the fact that newborns receive a blood transfusion of approximately 80 ml within the first minute and 100 ml within the first three minutes. This volume supplies 40-50 mg/kg, preventing iron deficiency in the first year of life and increasing hemoglobin and hematocrit levels in infants with a 2-minute delayed cord clamping.

Research resulth indicates that immediate cord clamping (within 5-10 seconds), compared to delayed clamping, results in a reduction of 20-40 ml of blood per kilogram of body weight, equivalent to 30-35 mg of iron (2). That the average optimal time for umbilical cord cutting in newborns is approximately 45 minutes or delayed until the cord stops pulsating (3).

The study also showed a significant difference in hemoglobin levels before cord cutting between the delayed clamping group and the immediate cutting group.

In a preliminary study conducted by the researcher at the Child Clinic in Mojo Kediri in March 2023, it was observed that cord cutting was performed immediately (5-10 seconds) after birth for five infants(4). Hemoglobin examinations revealed that three infants had Hb levels <17 g/dl, while two infants had Hb levels >17 g/dl. Given the background and observed phenomena, there is a need for further research on the Influence of Delayed Umbilical Cord Clamping on the Increase of Hemoglobin Levels in Newborns at the Child Clinic in Mojo Kediri in 2023.

Methods

The analysis of the data used univariate analysis, and bivariate analysis with chi square. The values wereset on $p < 0,05$. This research employs a quasi-experimental design with a Post-test Design With Control Group. The population for this study comprises all infants born at the Child Clinic in Mojo Kediri during the period from April to June 2023, totaling 30 infants. The sampling technique utilized is non-probability sampling, with a sample size of 18 individuals meeting both inclusion and exclusion criteria. Data collection involves the use of a checklist for measurement results and Standard Operating Procedures (SOP) for umbilical cord cutting. The dependent variable is the increase in Hb levels, while the independent variable is the delay in umbilical cord cutting. Univariate analysis is employed to describe the hemoglobin levels with delayed cord cutting, presenting mean values, standard deviation, minimum, and maximum values. Meanwhile, bivariate analysis is conducted to examine the influence of delayed cord cutting on hemoglobin levels after 60 minutes and 15 minutes using an independent t-test.

Results

Characteristics of Respondents

Table 1. Frequency distribution based on respondent characteristics

Characteristics	Category	Delaying the cutting of the umbilical cord after 60 minutes		Immediate cutting of the umbilical cord after birth	
		F	%	F	%
Baby's weight,	2000-	2	22,2	2	22,2
	2500gr	4	44,4	4	44,4
	2600-	3	33,4	3	33,3
	3000gr				
	3100-				
	3500gr				
Gender	Male	5	55,6	5	55,6
	Female	4	44,4	4	44,4
Total		9	100	9	100

Based on the table above, in both the delayed umbilical cord cutting group and the control group, the majority of babies have a weight between 2600 grams and 3000 grams, each consisting of 4 babies (44.4%). The gender of the babies is mostly male in both the experimental and control groups, with 5 babies (55.6%).

The Effect Of Delaying Umbilical Cord Cutting On Hemoglobin Levels In Newborn Babies

Table 2. The Effect Of Delaying Umbilical Cord Cutting On Hemoglobin Levels In Newborn Babies

Hemoglobin Level	Mean	Min-Max	Mean Difference	t count
60-minute delay	19,800	18,3- 21,6	2,956	5,937
15-minute delay	16,844	15,6- 18,3		
<i>P Value:</i> 0,000				

Based on table 2, it can be seen that the hemoglobin (Hb) level of newborn babies after delaying cutting the umbilical cord for 60 minutes has an average value of 19,800 g/dl, a standard deviation of 1.2278 g/dl, a minimum value of 18.3 g/dl , and a maximum value of 21.6 g/dl. Meanwhile, the hemoglobin (Hb) level of newborn babies after delaying cutting the umbilical cord for 15 minutes has an average value of 16.844 g/dl, a standard deviation of 0.8502 g/dl, a minimum value of 15.6 g/dl, and a maximum value of 18 .3 g/dl.

Based on analysis using the paired t test to test the difference in Hb levels between a 60 minute delay in cutting the umbilical cord and a 15 minute delay, there was a difference of 2,956 g/dl (19,800 – 16,840). The statistical test produces a calculated t-value of 5.937, while the t-table with degrees of freedom $n-1 = 9-1 = 8$ and $\frac{1}{2} \alpha = 2.5\%$ is 2.1009. Therefore, the t value (5.937) is greater than the t table (2.1009), because the calculated t value is higher than the tabulated t value, and the p value is $0.000 < \alpha 0.05$, which means zero. hypothesis (Ho) is rejected. This means that there is an effect of delaying cutting the umbilical cord on Hb levels in newborn babies.

Discussion

Hemoglobin levels in delayed umbilical cord cutting for 60 minutes in newborns

Based on Table 2, it shows the hemoglobin levels in newborns with a 60-minute delay in umbilical cord cutting, having an average Hb level of 19.800 g% with a minimum Hb level of 18.3 and a maximum Hb level of 21.6 g%. One way to prevent iron deficiency anemia in newborns is by delaying umbilical cord clamping and cutting. Clamping and cutting the baby's umbilical cord at birth is an intervention that must be performed, but the optimal timing for this procedure is still controversial (2)

Delaying cutting after the pulsation is no longer felt is a common procedure in traditional childbirth. Meanwhile, early umbilical cord cutting is a procedure often performed in an institution. The timing of umbilical cord cutting has effects on both the mother and the newborn. Delayed cord cutting is a physiological approach involving cutting the cord when the pulsation has decreased. If the cord is not cut or clamped, umbilical circulation will stop with the closure of the umbilical arteries, and the cord stops pulsating (5)

One way to prevent iron deficiency anemia in newborns is by delaying umbilical cord clamping and cutting. Clamping and cutting the baby's umbilical cord at birth is an intervention that must be performed, but the optimal timing for this procedure is still controversial (1). According to the researcher, delaying umbilical cord cutting can increase Hb levels in newborns after 24 hours, showing a higher and significantly increased Hb level(6). This is because delaying cord cutting reduces the risk of anemia by 47% and reduces the risk of iron deficiency by 33% from 2 to 3 months of age.

Hemoglobin levels in delayed umbilical cord cutting for 15 minutes in newborns

Based on Table 2, the hemoglobin (Hb) level in newborns with a 15-minute delayed umbilical cord cutting is 16.844 g%, with a minimum Hb level of 15.6 g% and a maximum Hb level of 18.3 g%. Slowing down the umbilical cord cutting for 30 to 45 seconds is stated to increase blood volume by 8 to 24%. Newborns who have just been born are said to receive 80-100 ml of blood from the placenta (equivalent to 50-75 mg of iron) if cord cutting is delayed. Delaying cord cutting can also increase the storage of iron reserves at birth, preventing iron deficiency anemia

Research result that immediate cord clamping (within 5-10 seconds), compared to delayed cord clamping, results in a reduction of 20-40 ml of blood per kilogram of body weight, equivalent to 30-35 mg of iron. The practice of immediate or early cord cutting developed without considering the baby's needs can cause the baby's blood volume to vary by 25% to 40%. "However, immediate or early cord cutting can hinder a successful transition process and contribute to hypovolemic damage, low blood volume, oxygen deficiency, and hypoxia in newborns, especially vulnerable ones (premature, asphyxiated, low birth weight)" (6).

According to the researcher, the Hb levels in newborns with a 15-minute delayed cord cutting are physiologically caused by an increase in Hb levels. At birth, the normal hemoglobin level in newborns typically ranges from 14-20 g/dl, with an average of 17 g/dl. There is a relative increase in hemoglobin within 3-4 hours after birth due to hemokonzentration.

The difference in Hb levels between delaying umbilical cord cutting for 60 minutes and 15 minutes after birth in newborns.

Based on the research results, there is a difference in Hb levels between delaying umbilical cord cutting for 60 minutes and 15 minutes after birth in newborns at the Child Clinic in Mojo Kediri, with a p-value of 0.000. There is an average Hb level difference between mothers who underwent a 60-minute delayed cord cutting with an average Hb level of 19.800 and those who underwent cord cutting 15 minutes after birth with an Hb level of 16.844, resulting in a difference of 2.956 g%. This explains that delaying cord cutting for 60 minutes results in higher Hb levels in newborns compared to cord cutting at 15 minutes after birth.

The benefits for the baby from delaying cord cutting include higher hemoglobin levels, increased body iron reserves, and reduced anemia in further development. Higher red blood cell levels flow to vital organs, leading to better cardiopulmonary adaptation and increased breastfeeding duration in the early hours(7)

Several studies have examined the effects of cord cutting timing on hematological conditions and iron levels in infants during the first months of life. It can be concluded that delaying cord cutting for at least 2 minutes is very useful for the baby's iron levels in subsequent months (2 to 6 months)(8)

According to Yusni Podungge's 2019 research on the influence of delaying cord clamping on the hemoglobin levels of newborns in the Sipatana Public Health Center in Gorontalo City, out of 30 samples, the average Hb value for newborns who underwent a 15-minute delay in cord clamping was 21.80 g/dL.

Based on the research results, the Hb levels in newborns undergoing delayed cord cutting for 60 minutes or 15 minutes are within the normal category. According to Mercer (2018), the normal NBC hemoglobin level at birth ranges from 14-20 g/dL, with an average of 17 g/dL. In this study, the average Hb level for newborns with a 60-minute delayed cord cutting is 19.800 g%, while those with a 15-minute delayed cord cutting have an average Hb level of 16.844 g%. It is evident that delaying cord cutting for 60 minutes yields a better Hb level compared to newborns whose cord cutting is done at 15 minutes(9).

According to the researcher, a longer cord cutting time, i.e., 60 minutes, can increase Hb levels more significantly than cord cutting at 15 minutes because this placental transfusion can add more blood volume and red blood cells to the baby compared to faster cord cutting at 15 minutes. The longer the delay in cord cutting, the longer the blood transfusion to the baby, resulting in increased Hb levels.

Conclusions and Recommendations

Based on the analysis using an independent t-test, the obtained p-value is 0.010, which is less than α (0.05). Therefore, it can be concluded that there is an influence of delaying umbilical cord cutting on the increase in hemoglobin levels in newborns. It is hoped that other researchers can further develop this study to investigate the impact of delaying umbilical cord cutting on the increase in hemoglobin levels in newborns.

Acknowledgement

This research was made possible with the support of the university, especially the midwifery diploma program, the facilities provided by the research location, the respondents, and the support from family and friends. I sincerely express my gratitude for the invaluable support that has been given.

References

1. Artha D. Gambaran hasil peningkatan kadar hemoglobin pada pasien anemia yang ditransfusi dengan packed red cell dan whole blood di rsud kabupaten polewali mandar 1. *J Ilm Kebidanan*. 2020;2(1):10–5.
2. Nurrochmi, E., Hapitria, P., & Suhaemi C. Perbedaan Kadar Hemoglobin Pada Bayi Baru Lahir Yang Dilakukan Penundaan Pematangan Tali Pusat Dengan Yang Segera Dipotong Pada Persalinan Normal Di RSUD Gunung Jati Kota Cirebon Periode Februari-Maret 2018. *J Ilm Ilmu Kesehatan*. 2021;2(3):7–16.
3. Abalos et al. Utility of Gastroscopy at The Time of Colonoscopy in Patients With Iron-Deficiency Anemia Referred to A Colorectal Cancer Detection Program. *Endoscopy*. 2020;4(2):51–5.
4. Gupta R. dan Ramji S. Effect Of Delayed Cord Clamping On Iron Stores In Infants Born To Anemic Mothers: A Randomized Controlled Trial. *Indian Pediatr*. 2021;2(2):15–23.
5. Mercer K. Evaluation of anemia in communities ser aluation of anemia in communities served by Shoulder t y Shoulder to Shoulder Global: A Cross-Sectional Study in Santo Domingo, Ecuador. *Literati Imprint*. Penerbit Lentera Hati. 2020.
6. Sembiring, K., Lubis, B., Rosdiana, N., Nafianti, S., & Siregar OR. Status Imunitas Anak dengan Anemia Defisiensi Besi. *Cermin Dunia Kedokteran*. 2021;45(9):653–655.
7. Wiradharma, Kardana, Artana D. Risiko Asfiksia pada Ketuban Pecah Dini di RSUP Sanglah. *Sari Pediatr*. 2013;14(5):316–9.
8. Novitasari C. *Perpustakaan.Uns.Ac.Id Digilib.Uns.Ac.Id. Bioedukasi*. 2015;7–30.
9. Simbolon D. Faktor risiko sepsis pada bayi baru lahir di RSUD Curup kabupaten Rejang Lebong. *Bul Penelit Kesehat [Internet]*. 2008;(1 994). Available from: <http://ejournal.litbang.depkes.go.id/index.php/BPK/article/download/2166/1118>