

The Relationship of Anemia in Pregnant Women with Anthropometry and Apgar Score for Newborns in Dr. Tadjuddin Chalid Hospital, Makassar

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ABSTRACT

Introduction: Anemia is one of the problems in pregnant women that can affect the anthropometry of newborns that containing weight, body length, head circumference, and newborn score. The aim of this study aimed to determine the relationship between anemia of pregnant women to anthropometry and the Apgar score of newborns at Dr. Tadjuddin Chalid Hospital Makassar.

Methods: The method used in this research is observational analytic with a cross-sectional design. Sampling was done by purposive sampling. The total sample of 269 deliveries at Dr. Tadjuddin Chalid Hospital Makassar. The research data were sourced from secondary data such as patient identity, anemia of pregnant women, and infant anthropometry including weight, length, head circumference, and apgar score measured immediately after birth.

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Results: The results of this study indicate that anemia of pregnant women is significantly related to newborn body weight ($p = 0.007$), newborn body length ($p = 0.011$), newborn head circumference ($p = 0.039$), and anemia of pregnant women do not have a significant relationship with the Apgar of newborns score ($p = 0.088$).

Conclusion: This study concluded that the anemia status of pregnant women has a relationship with anthropometry of newborns on the parameters of body weight, body length, head circumference of newborns, and anemia status of pregnant women has no relationship with the Apgar score of newborns.

Keywords: Anemia of pregnant women; anthropometry; apgar score

Introduction

Anemia is defined as a decrease in the number of red cell mass which results in failure of the function of erythrocytes to carry sufficient oxygen to peripheral tissues (decreased oxygen carrying capacity).¹ According to the World Health Organization (WHO), mothers with anemia can be concluded when the Hemoglobin (HB) level in the blood is < 11 gr/dl, whereas based on sources from the Indonesian Ministry of Health, anemia in pregnant women is a condition of mothers with anemia of < 11 gr/dl in the first and third trimesters and of < 10.5 gr/dl in the second trimester of pregnancy.²

According to the World Health Organization (WHO), an estimated 1.62 billion people in the world suffer from anemia, and 56.4 million of which are pregnant women. WHO estimates that around 18.1 million pregnant women in Southeast Asia have anemia. Where the Southeast Asia has the highest prevalence compared to other countries.³

Data obtained from the Health Office of South Sulawesi Province, from 23,839 pregnant women whose hemoglobin levels were checked, pregnant women with hemoglobin levels of 8-11 mg/dl were 23,478 people (98.49%) while pregnant women with hemoglobin levels of < 8 mg/dl were 361 people (1.15%).⁴ Data from Dr. Tadjuddin Chalid Hospital in Makassar City in 2017 showed that as many as 731 vaginal deliveries were still dominated by the incidence of anemia in pregnancy, namely around 19 patients each month who were known during ANC and during delivery, and Dr. Tadjuddin Chalid Hospital usually accepts referral patients from local health centers.

There are three causes of direct maternal death, namely bleeding by 32%, hypertension by 25%, and infection by 5%. One of the indirect causes of death in pregnant women is anemia. Anemia contributes to the risk of death in pregnant women during pregnancy and after delivery by looking at other risk factors.⁵

Identification of the efforts to succeed in maternal health can be viewed from the Maternal Mortality

Rate (MMR) indicator. Where, MMR is the number of maternal deaths during pregnancy, childbirth and the *puerperium* during or in terms of its management but not due to other causes, for example accidents, etc., in every 100,000 live births. According to the Indonesian Ministry of Health in 2014, the MMR in Indonesia alone amounted to 359 per 100,000 live births. Where, if viewed from the Millennium Development Goals (MDG's) target in 2015 of 102 per 100,000 live births, this figure is still far from the estimated target.⁶

In Makassar, MMR was recorded for 3 consecutive years, namely 2015 (5 out of 25,181), 2014 (5 out of 24,590) and 2013 (4 out of 24,576). The cause of MMR in Makassar is due to bleeding other than hypertension and infection. Where anemia during pregnancy contributes to a sizeable death rate due to bleeding.⁷

Pregnant women who have anemia will have the risk of morbidity and mortality, especially in the increased anemia in pregnancy which causes high MMR when it occurs in Hemorrhage post-partum, and will have an impact on the fetus such as the risk of pre-term birth, birth weight, and *Apgar* value will also be low.⁸

Anemia will have an impact on pregnant women and the fetus where they can experience abortion, fetal obstruction during pregnancy, low birth weight (LBW), premature rupture of membranes (PROM), rapid cord decompensation infection (HB<6 g%), hyperemesis gravidarum, premature, hydatidiform mole, antepartum hemorrhage, intrauterine death, congenital defects and perinatal death.⁹

High incidence of anemia and the large impact of anemia on newborns made the researchers raise this topic as the research material.

Methods

The method used in this research was quantitative research using observational analytic methods with cross sectional approach. Design of this study was used to determine the relationship of the dependent variable, namely the anthropometry of newborns including body weight, body length and head circumference, with the independent variable being anemia in pregnant women. Research was conducted in December 2019 - January 2020 at Dr.Tadjuddin Chalid Hospital, Makassar City and has received ethical eligibility with the number E.003 / KEPK / FKIK / XII / 2019 dated 5 December 2019. Population in this study was all pregnant women who gave birth at Dr.Tadjuddin Chalid Hospital, Makassar City. Sampling was conducted using non-probability sampling techniques, namely purposive sampling with a total sample of 269 which met the inclusion and exclusion criteria. Those included in the inclusion criteria were pregnant women who gave birth to Dr. Tadjuddin Chalid Makassar City from January to December 2018, the method of vaginal delivery, has medical record data that can be evaluated, including: patient identity in the form of names and hemoglobin levels of pregnant women, anthropometry of newborns, namely body weight, body

length and head circumference and the *Apgar* score of the newborn. While the exclusion criteria were mothers with multiple pregnancies (Gemelli), suffering from diabetes, hypertension, heart disease, and asthma, and a history of labor: premature rupture of membranes, prolonged labor, IUGR / stunted fetal growth. Data source used in this research was secondary data. Secondary data were obtained from medical records at Dr.Tadjuddin Chalid Hospital Makassar City. The data obtained were analyzed using IBM SPSS 23 software. Analysis of the relationship between the dependent and independent variables was conducted using the Chi-Square test.

Result

Table 1 Distribution of Respondents Based on Medical Record Data Dr. Tadjuddin Chalid Makassar City in 2018

Characteristics	n	%
Anemia		
Yes	105	39
No	164	61
body weight		
< 2,500 grams	26	9.7
2,500 – 4,000 grams	240	89.2
> 4,000 grams	3	1.1
body length		
<48 cm	80	29.7
48-52 cm	189	70.3
head circumference		
<32 cm	27	10
32-37 cm	242	90
baby's Apgar Score		
high	5	1.9
moderate	8	3.0
normal	256	95.2

Source: Secondary Data, 2018

Table 1 shows the number of pregnant women who gave birth at Dr. Tadjuddin Chalid Makassar City in 2018 with anemia of 105 people (39%) while those who did not experience anemia were 164 people (61%). Data for babies with low birth weight (< 2,500 grams) were 26 (9.7%), babies with macrosomic birth weight (> 4,000 grams) were 3 babies (1.1%), while babies with normal birth weight (2,500 – 4,000 grams) of 240

people (89.2%). Data on babies with normal body length (48 - 52 cm) were 189 babies (70.3%), while babies with body length of < 48 cm were 80 babies (29.7%). Data on babies with normal head circumference (32 - 37 cm) were 242 babies (90%), while babies with head circumference < 32 cm were 27 babies (10%). Data for babies with high *Apgar* score (0-3) were 5 babies (1.9%) while babies with moderate *Apgar* score (4-6) were 8 babies (3.0%) and babies with normal *Apgar* score (7- 10) were 256 babies (95.2%).

Table 2 Analysis of the Relationship between Anemia in Pregnant Women and Baby's Body Weight on birth at Dr. Tadjuddin Chalid Makassar City in 2018

Anemia on Pregnant women	baby's body weight on birth (gram)		Total	<i>p-value</i>
	< 2,500	≥ 2,500		
Yes	17 (65.38 %)	88 (36.21%)	105 (39.03 %)	0.007*
No	9 (34.62 %)	155 (63.79%)	164 (60.97%)	
Total	26 (9.67%)	243 (90.33%)	269 (100.00%)	

Source: Secondary Data, 2018

**Chi Square* test, *p* value <0.05

Table 3 Analysis of the Relationship between Anemia in Pregnant Women and the Length of the Birth of a Baby at Dr. Tadjuddin Chalid Makassar City in 2018

Anemia on Pregnant women	baby's body length on birth (cm)		Total	<i>p-value</i>
	< 48	48 – 52		
Yes	41 (39.05%)	64 (60.95%)	105 (39,03%)	0.011*
No	39 (23.78%)	125 (76.22%)	164 (60.97%)	
Total	80 (29.74%)	189 (70.26%)	269 (100.00%)	

Source: Secondary Data, 2018

**Chi Square* test, *p* value <0.05

Table 4 Analysis of the Relationship between Anemia in Pregnant Women and the Head Circumference of a Born Baby at Dr. Tadjuddin Chalid Makassar City in 2018

Anemia on Pregnant women	Baby's head circumference on birth (cm)		Total	p-value
	< 32	32 – 37		
Yes	16 (15.24%)	89 (84.76%)	105 (39.03%)	0.039*
No	11 (6.71%)	153 (93.29%)	164 (60.97%)	
Total	27 (10.04%)	242 (89.96%)	269 (100.00%)	

Source: Secondary Data, 2018

*Chi Square test, p value <0.05

Table 5 Analysis of the Relationship between Anemia in Pregnant Women and the Apgar score of Baby Birth in Dr. Tadjuddin Chalid Makassar City in 2018

Anemia on Pregnant women	Apgar Score on birth		Total	p-value
	Asphyxia	Normal		
Yes	9 (8.57%)	96 (91.43%)	105 (39.03%)	0.088*
No	5 (3.05%)	159 (96.95%)	164 (60.97%)	
Total	14 (5.20%)	255 (94.80%)	269 (100.00%)	

Source: Secondary Data, 2018

*Chi Square test, p value <0.05

Discussion

Table 2 shows that pregnant women who gave birth at Dr. Hospital Tadjuddin Chalid Makassar City in 2018 experienced anemia as many as 105 people, of which 17 people (16.9%) gave birth to babies with low birth weight < 2,500 grams, and those who gave birth to babies weighing \geq 2,500 grams were 88 people (36.21%). Meanwhile, there were 164 pregnant women who were not anemic, 9 people (5.4%) gave birth to low birth weight < 2,500 grams, and 155 people who gave birth to babies weighing \geq 2,500 grams (63.79 %). Based on the results of the Chi-Square test, the p value was 0.004 ($p < 0.05$), so it was concluded that there was a significant relationship between anemia of pregnant women and the birth weight of the baby.

These results are in line with the research conducted by Wahyuni (2017) at the Puskesmas Trauma

Center Samarinda The results showed that there was a significant or positive relationship between hemoglobin levels of pregnant women in the third trimester and fetal body weight at the Trauma Center Puskesmas with a p value = 0.000.¹⁰ Another study by Sekhavat (2011) in Iran examined maternal anemia that was associated with an increased risk of low birth weight significantly. This shows that there is a positive relationship between maternal hemoglobin levels and birth weight of babies.¹¹ Research by Sari in the working area of Pujer Health Center suggested that there is a relationship between hemoglobin levels of pregnant women in the third trimester and the weight of newborns in Bondowoso.¹² However, the results were not in line with the research conducted by Setiawan (2015) in Kota Pariaman which stated that there is no association between anemia in third trimester pregnant women and infant birth weight ($p > 0.05$).¹³

Table 3 shows that pregnant women who gave birth at DR. Tadjuddin Chalid Makassar City in 2018 who experienced anemia were 105 people, of which 41 people gave birth to babies with a body length < 48 cm (39.05%) and 64 people who gave birth to babies with a body length of 48-52 cm (60.95%) (%). Meanwhile, there were 164 pregnant women who gave birth to babies with a body length < 48 (23.78%) and 125 people who gave birth to babies with a body length of 48-52 cm (76.22%). Based on the results of the Chi-Square test, the p value was 0.008 ($p < 0.05$), so it can be drawn that there was a significant relationship between anemia of pregnant women and the length of the baby's birth body.

This research was supported by previous research by Putri at RSPAD Gatot Soebroto Dietkesad in 2014 which suggested that there is a relationship between anemia in pregnant women and anthropometry of newborns which includes the length of the baby's body.¹⁴ Another study by Kaur in India showed a positive correlation between anemia with the length of the baby's body.¹⁵

Table 4 shows that pregnant women who gave birth at DR. Tadjuddin Chalid Makassar City in 2018 Who have experienced anemia were 105 people, of which 16 people gave birth to babies with head circumference of < 32 cm (15.24%) and those who gave birth to babies with a head circumference of 32-37 cm were 89 people (84.76%). Meanwhile, there were 164 pregnant women who gave birth to babies with head circumference of < 32 cm (6.71%) and those who gave birth to babies with head circumference of 32-37 cm were 153 people (93.29%). Based on the results of the Chi-Square test, the p value was 0.023 ($p < 0.05$), so it was known that there was a significant relationship between anemia in pregnant women and the head circumference of newborns.

This study is supported by Kaur, who showed a positive correlation between maternal anemia and infant anthropometry, namely head circumference ($p = 0.003$).¹⁵ Another study by Madaan (2015) in India noted a significant relationship between the degree of pregnant women and infant anthropometry ($p = 0.001$).¹⁶ However, this study is not in accordance with the study by Hassan in Egypt which showed that there is no relationship between maternal anemia and size of the baby's birth which included the head circumference of

the newborn.¹⁷

Table 5 shows that pregnant women who gave birth in Dr. Tadjuddin Chalid Makassar City in 2018 who experienced of anemia were 105 people, of which 9 people gave birth to asphyxia babies (8.57%) and those who gave birth with normal *Apgar* score were 96 people (91.43%). Meanwhile, there were 164 pregnant women without anemia, and there were 5 people (3.05%) who gave birth to asphyxia and 159 (96.95%) who gave birth with normal *Apgar* score. Based on the results of the Chi-Square test, the *p* value was 0.088 ($p > 0.05$), so it was known that there was no significant relationship between anemia of pregnant women and the *Apgar* score of newborns.

Our research is in accordance with the results noted by Sibarani (2015) at RSU Artha Medica Binjai which showed that there is no relationship between anemia and *Apgar* score of newborns.²⁰ Other research by Azhari (2016) showed no differences between scores at the first and fifth minutes in term pregnancy with anemia and with no anemia.¹⁸ Another study that is not in line with our study was done by Fatmasari (2015) at Ngudi Waluyo Wlingi-Blitar Regional Hospital regarding the effect of low anemia on the *Apgar* score of newborns.¹⁸ Another study by Alizadeh (2014) in Iran suggested that there is a significant relationship in anemic mothers which shows a low risk of *Apgar* score.¹⁹

Conclusion

Based on the results of the research analysis, it can be concluded that there is a significant relationship between anemia of pregnant women with weight, body length, head circumference of newborns and there is no significant relationship between anemia of pregnant women and the *Apgar* score of newborns.

A limitation of this study is that we did not assess other factors that might influence the anthropometry of the newborn, such as genetics and maternal BMI during pregnancy.

The suggestion of the authors of the next study is that it will expects to study other factors that can affect the anthropometry of newborns more specifically, such as genetics, so that the results obtained are more accurate. In addition, HB levels were measured not only in the third trimester but from the beginning of pregnancy to identify the changes in anemia status in pregnant women.

Conflicts of Interest

No potential conflict of interest relevant to this article was reported.

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