



Correlation of Birth Weight with Placenta Weight, Width, Thickness and Shape

¹ Asdina AR Damanika, ¹ Hotma Partogi Pasaribu, ¹ Edy Ardiansyaha

¹ Department of Obstetrics and Gynecology, Faculty of Medicine, University of North Sumatra

Abstract : Objective : To determine the correlation between the birth weight with the weight, width, thickness, and shape of the placenta. **Method :** An analytical study with an observational design and a cross-sectional study was conducted at the Department of Obstetrics and Gynecology, Faculty of Medicine, University of North Sumatra and other network Hospital. The research sample consisted of 30 pregnant women that planned vaginal delivery or sectio caesarea. Patient characteristic data was carried out. An examination of the weight, thickness, width and shape of the placenta immediately after delivery. Birth weight and the weight of fetal placenta is also measured. Data analysis of the correlation between independent and dependent variables used the Chi-square test. **Results:** Analysis of the correlation between birth weight and placental weight showed a value of $r = 0.994$ and a value of $p = 0.000$. There was significant relationship and strong correlation. Based on the analysis of the birth weight with the width of the placenta also obtained significant results and a strong correlation with a value of $r = 0.799$ and a value of $p = 0.000$. Then an analysis of the correlation of birth weight with placental thickness results found $r = 0.936$ and a value of $p = 0.000$, which means that there is a significant relationship and a strong correlation. However, the relationship between birth weight and the shape of the placenta is not significant and has a weak correlation $r = 0.149$ and $p = 0.049$. **Conclusion :** Significant relationship and strong correlation between birth weight and placental weight, width and thickness. But not significant and weak correlation with the shape of the placenta.

Keywords : baby birth weight, weight, width, thickness, shape of the placenta

I. INTRODUCTION

It is important to exam birth weigh at the time of the delivery. The results of measurements are a real picture to find out how the fetus develops during the womb. Indonesia is ranked ninth with the percentage of low birth weight (LBW) around 6.2% of born each year. ¹ Birth weight less than 2500 grams are defined as LBW. The mortality rate is 12 times higher and the morbidity rate is 3 times higher than normal birth weight. ²

The factors that directly affect the birth weight have been studied before. Several maternal factors have a significant influence. ³ In addition, the factor of weight, thickness, width and shape of the placenta is also one of the things that is quite crucial in determining baby birth weight. The placenta is a network or functional unit that connects the mother and the fetus. The placenta provides various information during pregnancy, especially as a detector in case of fetal distress. ⁴

There are two theories regarding the role of the placenta in pregnancy. The first theory assumes that the placenta is formed by the mother and the fetus, so that the characteristics of the placenta are highly dependent on the genetic degree between the mother and the fetus. The second theory suggests that the placenta is attached to and highly dependent on the fetus. Hasra Mukhlisin's research found a significant relationship between placental weight and fetal weight. Waszak's research in 2013 revealed that decreased function of the placenta will affect the number of perfusion areas between mother and fetus, causing disruption of the transfer nutrients and oxygen from mother to fetus. From this theory it can be concluded that birth weight is very dependent on the size and function of the placenta. The placenta acts as a nutritional sensor from mother to fetus, according to the mother's ability to give birth, and the needs of their fetus. The weight of the placenta, the size and shape of its surface, reflect its ability to transfer nutrients. ^{4,5}

II. RESEARCH METHODOLOGY

This research is an analytical observational study with cross-sectional design study conducted at the Department of Obstetrics and Medical Gynecology, University of North Sumatra and other network Hospital from November 2022 until the number of samples is fulfilled.

The research sample was 30 and selected by consecutive sampling method. Participants were pregnant women with term gestation (37-42 weeks) without complications, aged 18 years or more and single fetus. While participants who were excluded were pregnant women with comorbidities in pregnancy such as a history of myasthenia gravis, chronic hypertension (during pregnancy), pregnancy with hydramnios, premature rupture of membranes, diabetes mellitus (gestational diabetes mellitus), malabsorption syndrome, kidney disease, heart disease, coagulation-related blood, placenta previa (acreta, increta, percreta), and previous liver disease (hepatitis B), pregnant women who had preterm labor (gestational age below 37 weeks), term babies with congenital anomalies, placental deformities such as placenta fenestra ,

Pregnant women who come to the delivery room at H. Adam Malik Hospital and other network Hospital planned for vaginal delivery or sectio caesarea surgery will be subjected to anamnesis, physical examination and obstetric-reproductive examination (according to indications). The patient was then provided with information and a request for informed consent for the study examination. Then an

examination of the placenta was carried out, both from the weight, thickness, width, and shape of the placenta and data was recorded. As well as weighing the newborn.

Data were analyzed using SPSS version 21. The data is presented descriptively to see the frequency distribution of the variables studied. The mean difference between variables was tested by Chi-square test. Data are presented as mean \pm SD, and $p < 0.05$ was considered statistically significant.

III. RESULTS

Samples that met the inclusion and exclusion criteria totaled 30 samples. Based on Table 1 below, it shows that all the samples that have been collected are over 20 years old with a total sample of 30 people (100%). From the Table below, it shows that the majority of the sample is primigravida with a sample of 18 people (60%) compared to secundigravida with a sample of 4 people (13.3%) and multigravida with a sample of 8 people (26.7%). From the last education sample that has been collected, the majority of the last education of pregnant women is at the high school level with a sample of 12 people (40%) compared to the elementary level with a sample of 4 people (13.3%), junior high school with a sample of 7 people (23.3%), and college with a sample of 7 people (23.3%).

Table 1. Frequency Distribution of Age of Pregnant Women, Gestational Age, Total Parity, Education Level

Age of pregnant woman	Frequency	%
<20 years	0	0
>20 years	30	100
Parity		
Primigravida	18	60
Secundigravida	4	8
Multigravida	8	26,7
Education		
SD	4	13,3
Junior High School	7	23,3
Senior High School	12	40
College	7	23,3

Table 2. Value and Mean Recorded Birth Weight

No.	Weight	Frequency(%)	Mean \pm SD
1.	Overweight	2 (6.7%)	
2.	Normal Weight	27 (90%)	3221.33 \pm 468.637
3.	Underweight	2 (6.7%)	

Based on Table 2 above, it shows that the majority of the sample had normal birth weight with a sample number of 27 babies (90%) compared to the number of overweight with 2 babies (6.7%) and underweight with the same number of 2 babies (6.7%). From these samples, the average birth weight was also calculated with mean of 3221.33 grams and a standard deviation of 468.637.

Table 3. Frequency Distribution of Placenta Shapes

Form of the Placenta	Frequency	%
Discoid	25	83.3
Ovoid	5	16.7%

Based on Table 3 above, the placenta that was born was measured and assessed for its shape by the researchers. Of the 30 samples studied, it was found that the majority of the placenta shapes were discoid with a sample size of 25 (83.3%) compared to the ovoid placenta with a sample size of 5 (16.7%).

Table 4. Values and mean weight and width of the placenta

No.	Placenta Weight Category	Frequency (%)	Mean \pm SD	Placenta Width Category	Frequency (%)	Mean \pm SD	Placenta Thickness Category	Frequency (%)	Mean \pm SD
1	Over Weight	5 (16.7%)	516.71 \pm 76.36	Larger Placenta Width	0 (0%)	18.83 \pm 2.16	1.5-2.5 cm thick	0 (0%)	3.37 \pm 0.39
2	Normal Weight	12 (40%)		Normal Placenta Width	30 (100%)		2.5-3.5 cm thick	30 (100%)	
3	Low Weight	13 (43.3%)		Placenta Width Less	0 (0%)				

Based on Table 4 above, it shows that the overweight placenta is 5 (16.7%), the normal weight is 12 (40%), and the low weight is 13 (43.3%). The mean weight of the placenta was calculated with a result of 516.71 grams and a standard deviation of 76.36. Then, all the number of samples (30 samples) had a normal placental width category with an average placental width of 18.83 cm and a standard deviation of 2.16. Finally, all samples (30 samples) have a category of 2.5-3.5 cm thick placenta with an average thickness of 3.37 cm and a standard deviation of 0.39

Table 5. Correlation of Newborn Weight with Placenta Weight

	r value	p value
Newborn weight	0.994	0.000

In this study, an analysis was carried out on the correlation of birth weight with placental weight. The data that has been collected is tested for normality and then analyzed for correlation using Pearson's correlation. From the analysis, it was found that the value of $r = 0.994$ and the value of $p = 0.000$. This shows that the analysis of birth weight with placental weight is significant and has a strong correlation.

Table 6. Correlation of Newborn Weight with Placenta Width

	r value	p value
Newborn weight	0.799	0.000

This study also conducted an analysis of the correlation between birth weight and placental width. Based on the data analyzed and presented in tabular form in Table 6, it was found that the value of $r = 0.799$ and the value of $p = 0.000$. This shows that the analysis of birth weight with placental width is significant and has a strong correlation

Table 7. Correlation of Newborn Weight with Placenta Thickness

	r value	p value
Newborn weight	0.936	0.000

This study also conducted an analysis of the correlation between birth weight and placental thickness. Based on the data analyzed and presented in tabular form in Table 7, it was found that the value of $r = 0.936$ and the value of $p = 0.000$. This shows that the analysis of birth weight with thick placenta is significant and has a strong correlation.

Table 8. Correlation of Newborn Weight with Placenta Shape

	r value	p value
Newborn weight	0.149	0.049

This study also conducted an analysis of the correlation of birth weight with the shape of the placenta. Based on the data analyzed and presented in tabular form in Table 8, it was found that the value of $r = 0.149$ and the value of $p = 0.049$. This shows that the analysis of birth weight with the shape of the placenta is not significant and has a weak correlation.

IV. DISCUSSION

This study showed that the average weight of the sample placenta was 516.71 grams with a standard deviation of 76.36. These results correspond to the average weight of the placenta at term, which is 508 g. The ratio between the weight of the placenta and the birth weight of the newborn is 1:6. However, the way it is measured varies widely mainly due to differences in placental preparation. Previous studies have shown that placental weight is associated with pregnancy outcomes. Barker et al reported that changes in placental growth were predictors of maternal illness.⁶

Analysis of birth weight with placental weight and width in this study was significant and had a strong correlation. In line with a study conducted by Gupta et al on 100 placentas, a strong correlation was found between the weight, volume, and diameter of the placenta and the birth weight. Then a study in Nigeria by Panti et al found a positive correlation between placental weight and birth weight. BaGhel et al also found a strong correlation between placental thickness and low birth weight and IUGR in 100 patients.^{6,7,8}

From the correlation test conducted, it was found that the value of $r = 0.936$ and the value of $p = 0.000$ was found in the correlation between birth weight and placental thickness. The comparative study by Leyto et al. who analyzed 249 samples of placenta of newborns in an Ethiopian hospital, found that abnormal thickness on placenta have 5 times risk of causing LBW.⁹

The correlation analysis of birth weight with the shape of the placenta shows a value of $r = 0.149$ and a value of $p = 0.049$ which indicates not significant and a weak correlation. This is not in line with the study of Kambale et al which showed poor outcomes of abnormal birth weight to the thickness, width and shape of the placenta.¹⁰

V. CONCLUSION

This study demonstrated a significant relationship and a strong correlation between birth weight and placental weight and width. In addition, there was also a significant relationship and a strong correlation between birth weight and placental thickness. However, it is not significant and has a weak correlation between birth weight and the shape of the placenta.

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