

# Sonographic Association Of Placental Maturity Grades With Maternal Anemia In Third Trimester Of Pregnancy

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## Abstract

**Background:** The placenta plays an active role in fetal programming during intrauterine life. Adequate fetal growth and subsequent normal birth weight depends on the efficient delivery of nutrients from the mother to the fetus via normally functioning utero-placental organ. Advances in imaging techniques have enabled to identify abnormality in various placental parameters to group high risk pregnancies. **Objective:** To find the association of placental maturity grades with maternal anemia in third trimester of pregnancy. **Methodology:** A cross sectional study was conducted at Department of Radiology in Meer Children and Family Clinic, Lahore. Sample of 150 pregnant females collected using convenient sampling technique. All the anemic and non-anemic patients coming for ultrasound in third trimester of pregnancy were included and patients of any blood disorder or fetal morphological anomaly were excluded. Data analysis was done using Statistical software for social sciences (SPSS) version 25.0. **Results:** A total of 150 patients from the age group 21-38 were presented to ultrasonography department to find out the sonographic association of placental maturity grades with maternal anemia in third trimester of pregnancy. 122 patients (81.3%) had grade I placental maturity and 28 patients (18.7%) had grade II placental maturity out of total 150 patients. There were no patients with grade 0 or grade III placental maturity. Out of 150 patients, 51 patients (34%) were anemic and 99 patients (66%) were non-anemic. **Conclusion:** Our study showed a strong association between placental maturity grades and anemia and by this we can say that placental maturity grades can be used as a predictor of anemia. In addition to this, multi gravidity is also a major cause of anemia.

**Key Words:** Anemic, Gravidity, Hemoglobin, Placenta, Placental maturity.

## 1. INTRODUCTION:

About one-third of the world's population suffers from anemia, a condition in which an individual's hemoglobin (Hb) concentration or red blood cell (RBC) levels are below normal and inadequate to meet their physiological needs.<sup>1</sup> Multiple factors, including pregnancy and fetal growth, are impacted by anemia in pregnant women. It is a well-known fact that hemoglobin (Hb) physiologically decreases around the middle of the third trimester. This physiological decline is explained by a rise in plasma volume and a corresponding fall in blood viscosity. The placenta's circulation is improved as a result.<sup>2</sup> Physiological anemia develops during pregnancy as a result of the expansion of plasma volume, which lowers hemoglobin levels. This is why the usual limit for anemia in non-pregnant women was 12g/dl, while the World Health Organization defines anemia in pregnant women as having a hemoglobin level of 11g/dl or less.<sup>3</sup> When compared to pregnant women who do not have anemia, pregnant women with hemoglobin levels below 11 g/dl have a higher chance of having babies with low birth weights.<sup>4</sup>

A healthy utero-placental organ is necessary for the proper transfer of nutrients from the mother to the fetus and consequent normal birth weight.<sup>5</sup> In a healthy woman, the plasma volume begins to rise about week six of pregnancy. The physiologic decrease in the Hb concentration during pregnancy is caused by this increase, which is

disproportionally greater than the equivalent alterations on the red cell mass.<sup>6</sup> Certain pregnancy conditions either increase placental volume or placental mass, such as diabetes or numerous pregnancies and maternal anemia, or pregnancies at high altitude.<sup>7</sup> A wide range of pathologic occurrences can be diagnosed using the placenta's abnormal thickness. Placental thickness can help distinguish between a normal and abnormal pregnancy and can help manage fetuses that are at risk.<sup>8</sup> IUGR and pre-eclamptic patients had much thinner placentas. The evidence that is now available demonstrates the significance of several placental characteristics evaluated by ultrasonography in evaluating high risk pregnancies.<sup>9</sup> Because of the benefits it provides, including its ease of use, good safety record, and most importantly its contribution to real-time diagnosis, ultrasound continues to be the method of choice for identifying placental anomalies.<sup>10</sup>

World Health Organization (WHO) states that anemia affects 468 million non-pregnant women and 293 million young children worldwide, with iron deficiency thought to be the cause of 50% of these cases (ID).<sup>11</sup> The prevalence of anemia during pregnancy is estimated to be 38% globally, affecting about 30% of women in reproductive age.<sup>12</sup> Fetal growth restriction caused by maternal malnutrition raises the chance of neonatal mortality.<sup>13</sup> Advanced imaging techniques have made it possible to group high-risk pregnancies by identifying abnormalities in a variety of placental characteristics.<sup>14</sup>

The following study contributes to the body of knowledge regarding the association of placental maturity grades with maternal anemia in third trimester of pregnancy. The results of this study showed a strong association between placental maturity grades and anemia and by this we can say that placental maturity grades can be used as a predictor of anemia. In addition to this gravidity is also a major cause of anemia.

## 2. MATERIAL AND METHODS:

In this cross-sectional study, during the time period of 7-month, 150 patients were examined in the ultrasound department at Meer children and Family clinic, Lahore. Obstetrical Ultrasound followed by sonography protocols was performed on these patients. Inclusion criteria include all the anemic and non-anemic patients coming for ultrasound in third trimester of pregnancy. Exclusion criteria focused on the patients with any blood disorder or fetal morphological anomaly. Data was collected after the approval of synopsis from ethical committee of The University of Lahore. Qualitative variables i.e. anemic and non-anemic patients as well as quantitative variables i.e. age, gravidity, HB, placental maturity grade, placental thickness and gestational age were recorded on data collection sheets. All collected data was entered in SPSS version 26.0. The data was analyzed and presented in the form of tables and pie-charts.

## 3. RESULTS:

In the time period of 7-months, a total of 150 patients from the age group 21-38 were presented to ultrasonography department to find out the sonographic association of placental maturity grade with maternal anemia in third trimester of pregnancy. 122 patients (81.3%) had grade I placental maturity and 28 patients (18.7%) had grade II placental maturity out of total 150 patients. There were no patients with grade 0 or grade III placental maturity. Out of 150 patients, 51 patients (34%) were anemic and 99 patients (66%) were non-anemic.

**Table 1: Placental maturity grade \* Anemic Cross tabulation**

<b>Placental maturity grade (0,I,II,III) * Anemic (Yes/No) Crosstabulation</b>					
		Anemic (Yes/No)		Total	P=
		NO	YES		
Placental maturity grade	I	87	35	122	0.00
		71.3%	28.7%	100.0%	
II	12	16	28		
		42.9%	57.1%	100.0%	
Total		99	51	150	
		66.0%	34.0%	100.0%	

Table 1 shows that the total count was 150 from which 122 patients (81.3%) had grade I placental maturity in which 35 patients (28%) were anemic. 28 patients (18.7%) out of 150 patients had grade II placental maturity in which 16 patients (57%) were anemic. From total count of 150, 51 patients (34%) were anemic and 99 patients (66%) were non-anemic. Chi-square test shows association between placental maturity grades and anemia.

**Table 2: Gravidity \* Placental maturity grade Cross tabulation**

<b>Gravidity * Placental maturity grade Crosstabulation</b>					
		Placental maturity grade (0,I,II,III)		Total	
		I	II		
Gravidity	1.	31	7	38	
		81.6%	18.4%	100.0%	
	2.	42	3	45	
		93.3%	6.7%	100.0%	
	3.	33	10	43	
		76.7%	23.3%	100.0%	
	4.	15	6	21	
		71.4%	28.6%	100.0%	
	5.	0	2	2	
		0.0%	100.0%	100.0%	
	6.	1	0	1	
		100.0%	0.0%	100.0%	
	Total		122	28	150
			81.3%	18.7%	100.0%

Table 2 shows that from a total of 150 patients, 122 (81.3%) had grade I placental maturity from which 31 patients (81.6%) were of gravida 1, 42 patients (93.3%) were of gravida 2 and 33 patients (76.7%) were of gravida 3.

**Case 1**



The above figure shows that the placental maturity grade is I and placental thickness is 2.7cm at 28.5 weeks gestational age while the hemoglobin level is 11.2 g/dl.

#### Case 2



The above figure shows that the placental maturity grade is II and placental thickness is 3.8cm at 37.6 weeks gestational age while the hemoglobin level is 8.9 g/dl.

#### 4. DISCUSSION:

The main objective of our research was to determine ultrasonographically that whether there is association between placental maturity grades and maternal anemia in third trimester of pregnancy or not. A cross-sectional study was done for the diagnostic purposes of all the anemic and non-anemic patients coming for ultrasound in third trimester of pregnancy at Meer Children and Family Clinic, Lahore. Patients having any blood disorders or fetal morphological anomaly were not included. A total of 150 female patients from the age group 21-38 were included in the data.

According to our research study, 122 patients (81.3%) had grade I placental maturity and 28 patients (18.7%) had grade II placental maturity out of total 150 patients. There were no patients with grade 0 or grade III placental maturity. Out of 150 patients, 51 patients (34%) were anemic and 99 patients (66%) were non-anemic. Mean age was 27.65 and standard deviation was 4.04.

El Guindi W, et al. conducted a study to determine the influence of severe prenatal maternal anemia on the outcome of pregnancy. A total number of 222 patients were divided into two groups for comparison. 111 patients had anemia having Hb <8 g/dl was labeled as group A and the other 111 were non-anemic having Hb >10 g/dl was labeled as group B. According to this study, Age and parity differences between the two groups were insignificant. Anemia was most frequently caused by an iron deficiency in the group A (92.7%). It was noted that the rate of premature birth and the rate of low birth weight were both found to be significantly elevated by maternal anemia.<sup>15</sup>

Mehreen Muntaha, et al. and colleagues did a research study at Mansoorah Teaching Hospital and Gilani Ultrasound Center in Lahore to ultrasonographically associate the maternal anemia with placental thickness. A total of 110 patients were enrolled in this study. 44.5% of the 110 patients were in their second trimester, and 55.5% were in their third trimester. Among the patients, 26.4% had hemoglobin levels that were normal, compared to 43.6% who had moderate anemia and 30% who had mild anemia. The thickness of the placenta ranged from 10.50 mm to 56.50 mm. The third trimester's minimum and maximum placental thicknesses were 10.5 mm and 56.5 mm, respectively. The minimum and maximum hemoglobin levels in placental thickness that was considered normal were 7 and 15.5 g/dl, respectively. Less than five patients had hemoglobin levels of 7 g/dl, while the majority of patients had rates between 8 and 11 g/dl. According to their research it was determined that maternal anemia negatively affects placental thickness and gestational age.<sup>16</sup>

Our study also shows a cross tabulation between maternal anemia and placental maturity grades and the chi-square tests suggested that there is significant association found between maternal anemia and placental maturity grades. Table 1 shows that the total count was 150 from which 122 patients (81.3%) had grade I placental maturity in which 35 patients (28%) were anemic. 28 patients (18.7%) out of 150 patients had grade II placental maturity in which 16 patients (57%) were anemic. From total count of 150, 51 patients (34%) were anemic and 99 patients (66%) were non-anemic.

## 5. CONCLUSION:

Our study showed a strong association between placental maturity grades and anemia and by this we can say that placental maturity grades can be used as a predictor of anemia. In addition to this multi gravidity is also a major cause of anemia.

### 5.1 LIMITATIONS:

- Our study was limited to only grade I and grade II placental maturity due to limited time and small sample size.
- Also there were cases which we had to exclude because of no data available on HB.

### 5.2 RECOMMENDATIONS:

- It is recommended to reconduct the research with grade 0 and grade III placental maturity.
- All the patients are recommended to have their HB reports with them.

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