Original Article

Assessment of Placental Grading in Normal and Pregnancy Induced Hypertensive Mothers on Ultrasonography and Fetal Outcomes

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ABSTRACT

Objective: To evaluate the placental grading on ultrasound to predict the fetal outcomes in pregnancy induced hypertensive mothers as well as normal mothers.

Study Design: cross-sectional analytical study

Place and Duration of Study: This study was conducted at the department of Obstetrics and Gynecology and Anatomy of Bahawal Victoria Hospital, Bahawalpur between December 2021 to September 2022.

Materials and Methods: All the pregnant women with gestational age at least 28 weeks visiting the Obstetrics and Gynaecology Outpatient department during study duration were included in the study. Data was entered and analyzed through SPSS version 25. P value <0.05 was considered statistically significant.

Results: The mean age of the study participants was 26.65±10.34 years. On ultrasound, 6.3% 25.9%, 35.4% and 32.4% were fell in placental Grade-0, Grade-I, Grade-II and Grade-III maturity respectively. There was found statistically significant relationship placental maturity and gestational age of normal and pregnancy induced hypertensive mothers. There was statistically significant association (p=0.001) between placental maturity of normal mothers and mothers with pregnancy induced hypertension (PIH). Results presented with early maturation of placenta among hypertensive mothers. When a woman has high blood pressure, her placenta matures sooner. It was hospital based cross sectional study in which women who were visiting the hospital were included hence it is very difficult to generalize these findings for general population.

Conclusion: Ultrasonography predicted excellent picture for diagnosis of Grade-III placenta and it is more safe method than invasive procedures like amniocentesis.

Key Words: Fetal outcome, Ultrasonography, Placental grading, Hypertension.

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INTRODUCTION

High risk pregnancy like pre-eclampsia increases the chances of intra-uterine growth retardation (IUGR). The feto-placental component is the collective term for the foetus and placenta. For the foetus to create and develop normally in utero, the placenta's development, ripening, and transform must all occur as expected. As pregnancy progresses, grey scale sequential ultrasound evaluation can be used to record placenta morphological alterations.

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Being a foetal organ, it makes sense that the placenta would develop similarly to other foetal organ systems. Placental deposition to some extent as the foetus gets closer to term is common, but speeded up placental ripening is linked to gestation high blood pressure, IUGR, and pregnancy complications in labour, each of which increase the likelihood of prenatal deaths.[1,2] McKenna et al (2005) affirmed that the presence of a level III placenta at 36 weeks gestation aids in the identification of high-risk pregnancies.[3, 4]

It is also believed that diabetes and Rhesus incongruence are linked to unusual placental calcified, with these situations causing a postponement in placental ripening.[5] A substantial correlation between antenatal and postpartum period mortality and deferred placental progression was already found. A scientist first noted the correlation between rising gestational age and ultrasonographically perceptible placental modifications, but afterward a team of researchers presented a classification model based on placenta looks.[6] Based on adjustments in the looks of the chorionic plate, placental substantiation, and basal overlay, they rated the placenta from 0 (immature) to III

(mature). Grade 0: Chorionic plate–Placental substance that is straight and well characterized – Homogenous. Basal layer –No concentrations. Grade I: Chorionic plate – Subtle undulation, Placental substance–Area of dispersed echogenicity the base layer - No concentrations. Grade II: Chorionic plate – Indentation that extends into the placenta but not to the basal layer, Placental substance – Linear echogenic concentrations. Basal level–Basal Checkering. Grade III: Chorionic plate - Indentation that extends to the basal layer. Placental substance-Acoustic shadows are cast by sizable anomalous densities. Basal layer–Echogenic densities increase in size and density.

If there are possible issues during pregnancy that could harm the mother, the foetus, or both, that pregnancy is deemed highly dangerous. Age of the mother, illnesses like high blood pressure, diabetes, renal or cardiovascular disease, PE, healthy births, placenta previa, etc. is among the variables that make a pregnancy significant risk. The assessment of foetal gestational sophistication using USG is nonintrusive. Grannum and colleagues discovered a strong link between foetal lung ripening as assessed by the lecithin/sphingomyelin (L/S) proportion and placental maturational modifications. A grade-III placenta and a fully grown L/S ratio were found to be 100% correlated, according to Ptrucha and colleagues. The purpose of the current research was to determine the effectiveness of placental sonographic scoring in forecasting neonatal result in heightened hazard and regular pregnancy.

MATERIALS AND METHODS

It was cross-sectional analytical study conducted at Bahawal Victoria Hospital, Bahawalpur between December 2021 to September 2022 at department of Obstetrics and Gynecology and Anatomy. All the pregnant women with singleton fetus with at least 28 weeks of gestation visiting the Obstetrics and Gynecology outpatient department during the study duration were included in the study. Data was collected by using a preformed questionnaire that included sociodemographic variables and study variables. The ultrasonography was done by the consultant Radiologist with at least five year experience after the postgraduate degree. Women patients with Pre-existing chronic hypertension or other significant medical conditions that may affect placental grading, Multiple gestations (e.g., twins, triplets) due to potential differences in placental development and inadequate ultrasound images or reports for accurate placental grading assessment were excluded from the study. Data was analyzed through SPSS version 25. The frequency pregnancy induced hypertension among females was calculated. Cross tabulation was done according to gestational age and placental grading. Chi square test was applied to see statistically significant difference between the groups and p value <0.05 was considered statistically significant.

RESULTS

Total, 1260 women with gestational age at least 28 weeks or greater were included in the study. The mean age of the study participants was 26.65±10.34 years. Out of total 1260, 92 (07.3%) were suffering from Pregnancy Induced Hypertension (PIH), and 1168 (92.7%) had normal pregnancies. The relationship between participant's gestational age and placental grading measured by ultrasonography showed that participants with gestational ages of 28 to 32 weeks, 33.1% had Grade-0 placenta, 41.6% had Grade-I, 7.2% had Grade-II, and 18.1% had Grade-III placental maturity. Placental maturity of Grade-0, I, II, and III was also observed in the gestation age category of 37 weeks or more by 0.9%, 2.7%, 28.5%, and 67.9% respectively.

The cross tabulation of placental grading in normal and mothers with PIH showed a non-significant difference sonographicaly (p=0.26).

Table No. 1: Distribution of respondents by pregnancy induced hypertension (PIH).

Risk status	Respondents	
	Frequency	Percentage
Normal	1168	92.7%
PIH	92	07.5%
Total	1260	100.00

Table No. 2: The relationship between participants' gestational age and placental grading as measured by USG.

Gestational age in weeks	Placental Grading by USG								Total	
	Grade-0		Grade-I		Grade-II		Grade-III			
	No	%	No	%	No	%	No	%	No	%
28-32	55	33.1	69	41.6	12	7.2	30	18.1	166	13.2
33-37	18	2.9	239	38.1	301	48.0	69	11.0	627	49.8
>37	04	0.9	13	2.7	133	28.5	317	67.9	467	37.0
	77	6.1%	321	25.5%	446	35.4%	416	33.0%	1260	100

x^2=124.40, df= 06, p<0.001

Table No.3: Placental maturity in normal and pregnancy induced hypertensive mothers (n=1268)

Placental Maturity	Normal		Fetal outcome PIH		Total	
	No.	%	No.	%	No.	%
Grade-0	73	06.3%	04	04.3%	77	6.1
Grade-I	303	25.9%	18	19.6%	321	25.5
Grade-II	414	35.4%	32	34.8%	446	35.4
Grade-III	378	32.4%	38	41.3%	416	33.0
Total	1168	100%	92	100%	1260	100.00

DISCUSSION

The significance of detecting placental degree by ultrasound at various gestational ages in both low- and high-risk pregnancies was highlighted by this cross-sectional analytical research. Approximately 43% of those females were pregnant at high risk. They included 23.5% who had hypertension, 16% who had diabetes mellitus, and 3.5% who had IUGR. A 43% of participants reported having regular antenatal checkups, while 57% reported irregular antenatal visits. It was also discovered in this research that 58% of participants had been moderately anemic and 34% had been severely anemic. It shows that things have changed more favorably in Pakistan, which may be attributable to the country's expanding access to mother and baby medical care centers.

According to research, in a healthy pregnancy, 41.6% of the placenta is grade I at gestations of 28 to 32 weeks, 48.00% is grade II at gestations of 33 to 37 weeks. These findings are consistent with findings of other research studies.[7,8] Grade-II and grade-III placenta were discovered in high blood pressure and IUGR women who were pregnant at high risk at gestational ages of 28 to 32 weeks. Between the ages of 33 and 37 weeks, uteroplacental ischemia may be the cause of grade-II and grade-III placenta in APH cases. The childbirth would probably become complex with IUGR and Pre-eclampsia if the placenta emerged to be grade-I before 27 weeks, grade-II before 32 weeks, and grade-III before 34 weeks gestation.[10-12]

In the latest studies, it was also discovered that mothers with high blood pressure tended to have a premature placenta, while mothers with diabetes had a deferred placenta ($p>0.05$), but these trends were not statically important. [13-16] The results of study are like those of other studies which demonstrated that placental maturation was deferred in Rhesus negative cases but speeded up in instances of hypertension, APH, and IUGR.[17-21] Despite the fact that this had been a cross-sectional research, the authors made an effort to provide a comprehensive vivid view of the sonographic placental grading and its connection to pregnancies with high blood pressure. It was hospital based cross sectional study in which women who were visiting the hospital were included hence it is very difficult to generalize these findings for general population.

CONCLUSION

Ultrasonography predicted excellent picture for diagnosis of Grade-III placenta and it is more safe method than invasive procedures like amniocentesis.

Author's Contribution:

Concept & Design of Study:	Sadaf Mushtaq
Drafting:	Rukhsana Aziz, Aasima Sharif
Data Analysis:	Hamad Masood
Revisiting Critically:	Sadaf Mushtaq, Rukhsana Aziz
Final Approval of version:	Sadaf Mushtaq

Conflict of Interest: The study has no conflict of interest to declare by any author.

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