

## Evaluation of Placental Grading in Normal and Pregnancy Induced Hypertensive Mothers by Sonological Method; Predicts Neonatal Outcome

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### Abstract

*Background & Aim:* The placenta is essential to fetal well being, growth and development. Ultrasonographic method is the best assessment method for placental evolution throughout antenatal care. Conventional 2D ultrasound has been widely used to study the evolution of placenta during pregnancy. This 2D evolution includes the assessment of the morphology and anatomy of the placenta, identification of its location and placental grading. Grannum. et al.(1979) devised systemic classification of ultrasonographic morphology of placenta based on the changes in the chorionic plate, placental substance and the basal layer, the three separate zones of placenta. *Material & Methods:* The present prospective comparative study is carried out on total 120 cases (59 Normal and 61 Hypertensive mothers) attending the department of Obstetrics and Gynecology and radio diagnosis at padmshri. Dr. D.Y Patil medical research center, Kolhapur. Patients were scanned using Mindray DC-7 real time USG machine with a sector array 3.5 MHz frequency transducers. Patients were asked to maintain a full bladder, for obtaining a better window for USG examination. Scanning Technique- With patient in supine position, jelly was applied over the abdomen and examination was carried out. Multiple longitudinal and transverse scans are necessary to demonstrate the placenta completely. Chi-square test was carried out for statistical analysis. *Result:* Placental maturity increases with gestational age in normal and high risk cases. In our study we observed hypermature placenta (Grade III) is common in hypertensive mothers. Fetal outcome is found to be directly related to severity of maternal hypertension. *Conclusion:* Thus, we conclude that regular monitoring of placenta in antenatal care is primary tool for fetomaternal surveillance in hypertensive pregnancies.

**Keywords:** USG Machine; Placental Grading; Placental Morphology; IUGR; PIH.

### Introduction

The Placenta is essential to fetal well being, growth and development; it can be demonstrated reliably and accurately by ultrasound. Intrauterine existence of fetus is dependent on placenta [1]. The term "Placenta" was used for the first time in 1559. Placenta is a mirror which reflects the intrauterine

status of the fetus. Though it does not become the part of body of neonate, it contributes much for the well-being of the fetus in utero by its protective nutritional & respiratory function. It appears at pregnancy & prepares the fetus for extrauterine life [2]. Ultrasonographic method is the best for placental evolution throughout antenatal care. Ultrasound evidence of the developing placenta can be seen as early as 6 wks of gestation. It appears as an area of high level echoer surrounding a border, representing the developing gestational sac. Approximately at 12 wks of gestation the structure of the placenta can be more clearly discerned [3]. Winsberg F. found in (1973) the first echoscopic description in placental tissue [4]. Conventional 2D ultrasound has been widely used for the evolution of Placenta during pregnancy. This 2D evolution includes the assessment of the morphology and anatomy of the Placenta, identification of its

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location, Placental grading & fetoplacental circulation [5]. Grannum. et al. (1979) devised systemic classification of ultrasonographic morphology of Placenta based on the changes in the chorionic plate, Placental substance and the basal layer, the three separate zones of placenta. The Placenta was grouped in to four grades from zero to three [6].

**Grade 0:-** Chorionic Plate straight and well defined Placental substance. Homogenous basal layer, no densities.

**Grade 1:-** Chorionic Plate subtle undulations, Placental substance scattered echogenic area. Basal layer no densities.

**Grade 2:-** Chorionic Plate indentation extends into Placenta but not to the basal layer.

**Grade 3:-** Chorionic Plate indentation that extend all the way to the basal layer.

## Materials and Methods

The present prospective comparative study is carried out on a total 120 cases after 28 weeks of pregnancy, attending the department of obstetrics and Gynecology and radio diagnosis at Padm. Dr. D.Y. Patil medical research center, Kolhapur. This hospital is around 500 bedded with well equipments and facilities. Clearance of Institutional Ethical Committee was obtained before starting the work. The present cases are divided into normal and pregnancy induced hypertensive groups according to personal history, general examination of patient & recording of Blood Pressure.

A patient with rise of at least 30 mm of Hg & 15 mm of Hg in systolic and diastolic pressure respectively over previous known blood pressure was diagnosed to have Pregnancy induced hypertension. If previous BP was not known, then BP of at least 140/90 mm of Hg was considered abnormal.

B. P. > 140 / 90, without proteinuria and oedema is P.I.H.

Women attending the antenatal clinic in the

Department of Obstetrics & Gynaecology who were referred for routine ultrasonography were selected for the study. After explaining the procedure and obtaining consent, these patients were subjected to ultrasonographic examination. Patients were asked to maintain a full bladder, for obtaining a better window for USG examination.

**Scanning Technique -** With patients in supine position, jelly was applied over the abdomen and examination was carried out. Multiple longitudinal and transverse scans are necessary to demonstrate the placenta completely. Oblique scans are also taken.

59 placentae of normal pregnancy is considered as control group and 61 placentae of Pregnancy Induced Hypertensive ( P.I.H.) mothers are taken as study group.

### Inclusion Criteria

1. Age group 20 to 35 yrs.
2. Third trimester above 28 wks of pregnancy.
3. Pregnant women having normal blood pressure & Pregnancy Induced Hypertension.

### Exclusion Criteria

1. Pregnancies with congenital anomalies
2. Pregnancy with hypertension with proteinuria & oedema
3. Twin pregnancy

## Observation Tables and Results

The Table 1 shows 50% of sample size is between age 20 to 25 years. Patients above 30 years of age are only 8.33%

The Table 2 shows 26 to 31 wks pregnancy found 62.5% of total no. of cases taken and 37.5% in between 32 to 37 wks. of gestational age.

The Table 3 shows on placental examination by usg grade 2 is 58.3% in normal and hypertensive mother.

Table 1: Age distribution (yrs)

Age distribution	Frequency(N)	Percentage (%)
20 to 25	60	50
26 to 30	50	41.67
>30	10	8.33
Total	120	100.0

**Table 2:** Gestational Age distribution (wks)

Gestational Age	Frequency(N)	Percentage (%)
26 to 31	75	62.5
32 to 37	45	37.5
Total	120	100.0

**Table 3:** Placental Grading

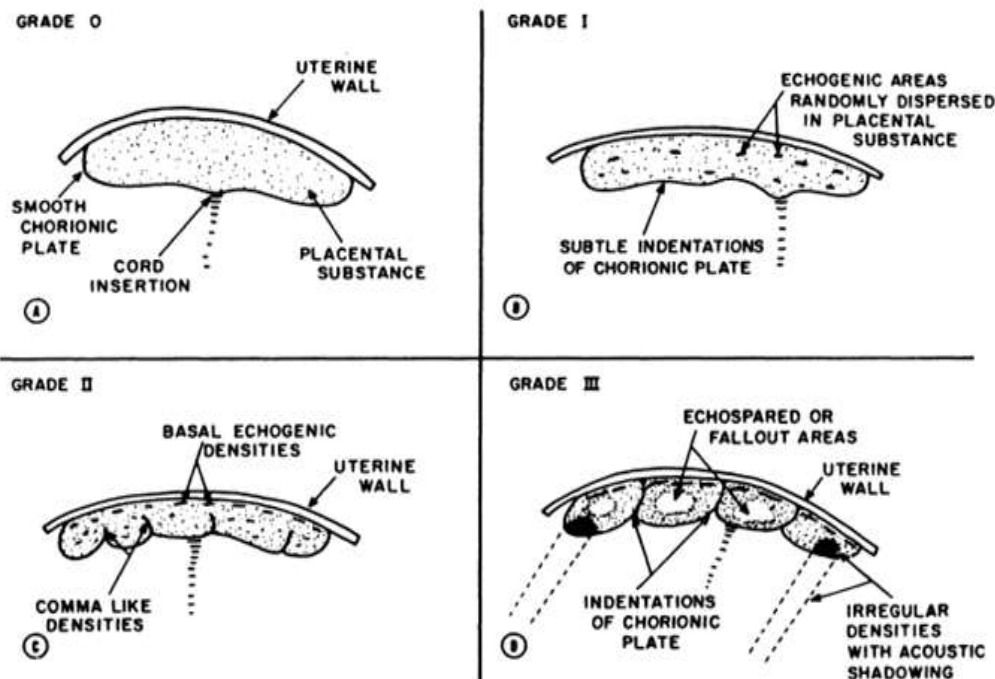
Placental Grading	Frequency(N)	Percentage (%)
Grade I	6	5.0
Grade II	70	58.3
Grade III	44	36.7
Total	120	100.0

**Table 4:** Association between PIH and Placental Grading

PIH	Placental Grading						Total	
	Grade I		Grade II		Grade III		(n)	(%)
	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)
Present	0	0	22	36.1	39	63.9	61	100
Absent	6	10.2	48	81.4	5	8.5	59	100
Total	6	5.0	70	58.3	44	36.7	120	100
Test	Value	DF	P value	Statistically significant				
Chi-square	41.908	2	0.000	Yes				

**Table 5:** Association between PIH and Pregnancy outcome

PIH	Pregnancy outcome								Total	
	Live Birth		IUGR		Severe IUGR		Death		(n)	(%)
	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)
Present	1	1.6	40	65.6	18	29.5	2	3.3	61	100
Absent	59	100	0	0	0	0	0	0	59	100
Total	60	50	40	33.3	18	15	2	1.7	120	100
Test	Value	DF	P value	Statistically significant						
Chi-square	116.066	3	0.000	Yes						



**Fig. 1:** Schematic diagram illustrating the appearance of the four placental grades (Reproduced with permission from Grannum [8]).



Fig. 2: This image shows placenta grade-II

Table 4 shows Association between PIH and Placental Grading is statistically significant.

This Table 5 shows Association between PIH and Pregnancy outcome is statistically significant.

### Discussion

According to Grannum classification Grade II & III of placenta are found in third trimester of patients. USG findings shows III grade placenta in hypertensive mothers. Hopper et al (1984) [7] noted that if the placenta appeared to be grade I prior to 27 wks, grade II prior to 32 wks and grade III prior to 36 wks of gestation, the pregnancy would likely to be complicated with intrauterine growth retardation and preeclampsia. Kazzi et al (1983) [8], Kumari et al (2001) [9] and Dudley et al (1993) [10] also reported the association of grade III placenta with small for gestational age infants. Zhang LY et al (2005) [11] says the grade III placenta maturation before 37 wks of gestation is associated with oligohydramnios and low birth weight and might help to predict placental dysfunction, which needs close monitoring for the benefits of mother and fetus. Ultrasound detection of a grade III placenta at 36 wks gestation in a low risk population helps to predict subsequent development of proteinuria –pregnancy induced hypertension and may help in identifying the growth restricted baby (Mckenna et al 2005) [12].

Proud and Grant (1987) [13] observed in study of 2000 unselected pregnant women the development of mature placental appearance grade III on USG by 34-36 wks gestation in high risk cases was associated with increased risk of low birth weight and perinatal death. My study findings are correlated with above studies so we conclude that hypertension and intrauterine growth retardation showed a strong correlation with accelerated placental maturation.

Sub chorionic fibrin was not found to be increased in this study. Most of the studies (Fox 1967, and Mallik et al 1979) did not record the increase of sub chorionic fibrin in hypertensive disorders. However Bandana Das (1996) noted an increased incidence of sub chorionic fibrin, but it did not affect the fetal outcome [1,14].

### Conclusion

As placenta is the mirror image of fetal outcome, on examination of placenta by sonological method there is definitive evidence of changes in placental morphology as well as grading in pregnancy induced hypertensive mothers.

Thus, we conclude that regular monitoring of placenta in antenatal care is primary tool for fetomaternal surveillance in hypertensive pregnancies because. It helps us to take timely action, plan the treatment & also counsel the patients in their future pregnancies.

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