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Original Research Article

## Comparison of placental grading at different periods of gestation in PIH patients and their outcome

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### ABSTRACT

**Background:** The current study follows grannum grading of placenta. It is well known that there is accelerated placental maturation in PIH patients and the ultrasonic appearance of grade 3 placenta before 37 weeks may signify placental dysfunction and is associated with development of low birth weight babies, IUGR meconium stained liquor, low APGAR score. Hence this study was conducted to emphasize on placental grading at different periods of gestation to predict and prevent increased obstetric and fetal compromise and to compare the outcomes.

**Methods:** Obstetric scans were performed in all PIH patients attending antenatal OPD and inpatients at ESIC and PGIMSR medical college, Bangalore to know the placental grading and biophysical profile. These women were followed till their delivery for obstetric and fetal outcomes.

**Results:** Grade 3 placenta is seen in 17 patients in group 1(50%) and 39 patients (59%) in group 2. For statistical analysis grade 1 and 2 were combined and compared with grade 3. P-value 0.198 which was not statistically significant. There was no statistically significant difference in age and gravidity between two groups. The medical disorders were more in group 2 i.e., between 37 - 40 weeks. The complications of PIH were also more in group 2. There were more number of LSCS (n=19 versus 14) in 34-36 weeks group which was not statistically significant. Fetal outcomes like IUGR and IUD were more in group 2 which was not statistically significant. The mean birth weight in group 1 was 2 kg as compared to 2.7 kg in group 2. All associated medical disorders were more in group 2.

**Conclusions:** In hypertensive women there is accelerated placental maturation leading to maternal and fetal complications. Hence women with accelerated placental maturity in ultrasound should be closely monitored and appropriately managed. However, we recommend larger randomized studies are necessary.

**Keywords:** Grannums study, Gestational age, PIH, Ultrasound placental grading

### INTRODUCTION

Placenta is essential for the fetal wellbeing, growth and development which can be evidenced as early as possible through ultrasound at 6 weeks of gestation.<sup>1</sup> Placenta mediates the intrauterine interaction between a mother and her baby.<sup>2</sup> The association of ultrasonically detectable placental changes with increasing gestational age was

first reported by Weinsberg et al, but it was Grannum et al who introduced a grading system based on ultrasonographic appearance of placentas.<sup>3,4</sup> They graded placentas from 0 to 3 on the basis of changes in the appearance of chorionic plate, placental structure and basal layer. According to Petrucha and Piatt, all placenta starts as grade zero.<sup>5</sup> The mean gestational age at which the placenta matures to grade 1 is 31.1 weeks, grade 2

around 36.3 weeks, grade 3 around 38 weeks. By 38 weeks, 5 to 10% of placentas present as grade 3.<sup>4,6</sup> It was thought that Grannum grade 3 placenta was associated with mature fetal lung and placental dysfunction.<sup>7</sup> In unselected population grade 3 placenta at or below 35 weeks gestation has been associated with subsequent development of preeclampsia and neonatal morbidity and mortality.<sup>8</sup> Mckenna et al and Cooley et al demonstrated an association of accelerated placental maturation and maternal disease.<sup>9,10</sup> This is further substantiated by other smaller studies.<sup>11</sup> 10% of all pregnancies are complicated by PIH. PIH causes endothelial dysfunction and placental dysfunction and hence maternal and fetal complications. This study was undertaken to know the placental grading at 36 weeks so that appropriate measures can be taken to prevent complications.

## METHODS

This is a prospective study done at ESIC and PGIMSR medical college Bangalore done from January 2016 to January 2017. Patients attending outpatient department of OBG and inpatient were included in the study. The institutional ethics committee approved the study. The inclusion criteria were all PIH patients (onset of high BP recording for the first time after 20 weeks gestation) who consented for the study were included.

Exclusion criteria was all chronic hypertension patients, patients with end organ damage.

The ultrasound examination was performed at 36 weeks gestation to determine placental maturity using phillips 2-5 MHz transabdominal probe. Placental maturity and fetal biophysical profile were noted. Placental grading was determined using Grannum grading from 0 to 3 by noting the architecture of basal plate, chorionic plate, and placental substance.

- Grade 0 - placenta has an easily delineated straight chorionic plate and a homogenous texture throughout
- Grade 1 - placenta has undulating chorionic plate and scattered echogenic areas within
- Grade 2 - small echogenic areas in the placenta along the basal layer, comma like echogenic areas at the chorionic plate
- Grade 3 - echogenic indentations from chorionic plate to basal plate forming discrete cotyledons.

The studied pregnant women were allocated into two groups

- Group 1 - 34 to 36 weeks
- Group 2 - 37 weeks - 40 weeks.

The two groups were compared for maternal age, parity, severity of hypertension, proteinuric or nonproteinuric,

other medical risk factors, IUGR, mode of delivery and fetal weight, APGAR.

## Statistical analysis

Data were analysed using software SPSS 20. Data were presented as frequency and percentage. P value calculated as Chi-square test and  $P \leq 0.05$  was considered significant.

## RESULTS

Grade 3 placenta is seen in 17 patients in group 1 (50%) and in group 2 - 39 patients (59%). For statistical analysis grade 1 and 2 were combined and compared with grade 3. P-value 0.198 which was not statistically significant.

**Table1: Comparison of placental grade between two groups.**

Placental grade	34-36 weeks	37-40 weeks
Grade 1	N = 5	3
Grade 2	N = 12	24
Grade 3	N = 17	39

**Table 2: Comparison of gravidity between two groups.**

Gravidity	34-36 weeks	37-40 weeks
Primi	20	29
Multi	14	37
<b>Total</b>	<b>34</b>	<b>66</b>

There were more number of primigravida in 34-36 weeks group (n = 20 versus 14) compared to 37-40 weeks group which had more number of multigravida (n = 37 versus 29). p value 0.158 which was not statistically significant.

**Table 3: Comparison of age.**

Age	34-36 weeks	37-40 weeks
20-30 years	19	45
30-40 years	5	21
<b>Total</b>	<b>23</b>	<b>76</b>

There were more pregnant women between 20-30 years in both groups. P value was 0.309 which wasn't statistically significant. The medical disorders were more in group 2 i.e, between 37 - 40 weeks. The complications of PIH were also more in group 2.

There were more number of LSCS (n = 19 versus 14) in 34 - 36 weeks group as compared to 37 - 40 weeks which had more number of vaginal deliveries (n = 36 versus 30). p value 0.255 which was not statistically significant. There were more number of patients between 20-30 years in both groups. There were 32 patients with mild PIH in group 2 compared to 18 patients in group 1, 18 patients with severe PIH in group 2 compared with 9 in group 1. Eclampsia was seen in 8 patients in group 2 but none in

group 1, abruption in 4 patients in group 2 but only one in group 1, IUD in 1 patient in group 2 none in group 1. All associated medical disorders were more in group 2.

**Table 4: Comparison of medical and obstetrical outcomes.**

Outcome	34-36 weeks	37-40 weeks
Previous LSCS	N = 9	11
Oligohydramnios	4	4
IUGR	4	7
Mild PIH	18	32
Severe PIH	9	18
Eclampsia	0	8
HELLP	7	8
Abruption	1	4
Anemia	1	3
GDM	2	7
Hypothyroid	7	10
IUD	0	1
Rh negative	0	5

**Table 5: Comparison of modes of delivery.**

Mode of delivery	34-36 weeks	37-40 weeks
LSCS	19	30
Vaginal delivery	14	36

## DISCUSSION

The placenta mediates the intrauterine interaction between a mother and her baby, it is directly responsible for mediating maternal environment necessary for fetal development.<sup>2</sup>

As the placenta ages, it begins to thin and in third trimester may calcify. In approximate 15% cases the calcifications extend completely through the substance of the placenta, completely outlining the cotyledons. These are termed grade 3 changes and should not occur before 34 weeks.<sup>12</sup> This study observed grade 3 placenta in more number of young primigravida patients in both groups as compared to multigravida which is comparable to study by Mc Kenna et al.<sup>9,13</sup> Premature placental maturation to a grade 3 configuration has been found in patients with chronic hypertension, preeclampsia, IUGR.<sup>14,15</sup> Grannum and Hobbins stated that finding of grade 3 placenta before 35 weeks may precede the diagnosis of preeclampsia, IUGR and should prompt close follow up of the patient for the between duration and pregnancy.<sup>4</sup> Grade 3 placenta remote from term is associated with fetal death, IUGR, fetal distress and meconium staining of liquor.<sup>16</sup> A recent study by cooley et al in 2010 suggested that higher granum grades were associated with increase in incidence of preeclampsia, obstetric intervention, SGA infants.<sup>11</sup> Placental grading has been used to predict an increased antepartum risk and can be used in evaluating fetuses at risk for intrauterine growth retardation.<sup>17</sup> Mc Kenna et al suggested that ultrasound

detection of grade 3 placenta in low risk population at 36 weeks may identify a subgroup of women at risk for developing proteinuric PIH in later stages of pregnancy and to have their labour induced for suspected fetal compromise.<sup>9</sup>

## CONCLUSION

In hypertensive women there is accelerated placental maturation leading to maternal and fetal complications. Hence women with accelerated placental maturity in ultrasound should be closely monitored and appropriately managed. However, we suggest larger randomized studies are required.

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