

Original Research Article

# Placental morphology in hypertensive disorders and its correlation to neonatal outcome

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## Abstract

**Background:** Placenta is a fetomaternal organ which is vital for maintaining normal pregnancy and promoting growth of the foetus. Pregnancy complications like Preeclampsia are reflected in the placenta both morphologically and microscopically as blood supply to the placenta is impaired in preeclampsia due to failure of trophoblastic invasion.

**Aim:** To correlate morphological changes of placenta with the severity of hypertension in the mother and to assess the neonatal outcome.

**Materials and methods:** It was a comparative study conducted on 200 women out of which 100 were having hypertensive disorders and remaining 100 were taken as control group. Placenta was collected from these women and studied for morphological changes and correlated with severity of hypertension. Neonatal outcome in the form of birth weight, Apgar score, need for neonatal resuscitation and admission to NICU were noted.

**Results:** It was found that placentae in women with preeclampsia were smaller in size, weighed less and associated with other changes like, retro placental hematoma, infarction and calcification.

**Conclusion:** Placental changes had good correlation to fetal weight.

## Key words

Placenta, Hypertension, Pregnancy, Morphology, Preeclampsia, Retro placental hematoma.

## Introduction

Placenta is the most accurate record of infant's prenatal record [1]. Hypertensive disorders of pregnancy along with haemorrhage and infection greatly contribute to maternal mortality and morbidity. In addition hypertensive disorders are associated with low birth weight, fetal growth restriction and prematurity which greatly contribute to perinatal morbidity and mortality. There is evidence that blood supply to fetal placental circulation is impaired in preeclampsia due to failure of trophoblastic invasion which usually occurs around 16<sup>th</sup> week of gestation. This failure leads to utero placental hypoxia thus affecting growth of the fetal vasculature and placental villi [2-5]. Trophoblast in preeclampsia is more proliferative but less invasive leading to decreased invasion of spiral arteries and thereby subsequent increase in utero placental resistance and decreased blood flow.

Fetus depends on placenta for its development. In preeclampsia placental changes reflect in the form of low birth weight, prematurity and stillbirth. Placenta in preeclampsia tends to be smaller. Incidence of placental infarction ranges from 30% in mild cases to 60% in severe cases. A fresh placental infarct is well demarcated, dark red in colour and is moderately firm. As infarct ages it becomes progressively hard and appears as a hard white plaque with smooth or slightly granular and amorphous cut surface. Extensive infarction is thus a visible hallmark of severely compromised placental circulation. Retro placental haematomas are seen in 5% of all of all pregnancies. Large lesions in which 40% or more of placental villus population is deprived of blood supply are associated with fetal hypoxia and stillbirth.

## Materials and methods

Aim of the present study was to note the morphological changes in placenta of women with preeclampsia and correlate them with severity of hypertension and neonatal outcome.

Study was conducted on 200 placentae collected from women who delivered in King George Hospital, Visakhapatnam over a period of one year from July 2014 to July 2015. 100 Placentae were from women with hypertensive disorders who were included in Group 1 i.e., STUDY group and remaining 100 acted as CONTROL group, Group 2.

### Inclusion criteria

Cases of hypertensive disorders of pregnancy like

- Mild Preeclampsia
- Severe Preeclampsia
- Eclampsia

### Exclusion criteria

- Gestational hypertension
- Chronic hypertension
- Twin pregnancies
- Gestational age <28 weeks.

Immediately after delivery placentae were collected and examined thoroughly and various parameters like weight, retroplacental hematomas, infarction and calcification were noted for comparison in various study groups. At the time of delivery fetal weight, Apgar score, need for resuscitation and admission into NICU were noted.

## Results

In the present study, 100 placentae were from women with hypertensive disorders of pregnancy and 100 were from normal women who acted as controls. In our study group, 54% of the women had mild preeclampsia as per **Table - 1**.

**Table – 1:** Distribution of cases.

| Hypertensive disorders | No. of cases | Percentage |
|------------------------|--------------|------------|
| Mild Preeclampsia      | 54           | 54         |
| Severe Preeclampsia    | 36           | 36         |
| Eclampsia              | 10           | 10         |

Weight of the placenta was less in preeclampsia and eclampsia group which was significant as it is related to fetal metabolism. In our study, placental weight of 400-500 g was observed in 44% of mild preeclampsia cases, 17% of severe preeclampsia and 10% of eclampsia cases as per **Table - 2**, which was similar to studies of Das, et al. who emphasised the effect of severity of hypertension on placental weight [3]. None of the cases of eclampsia had placental weight >500 g.

In our study, control group did not show any retroplacental hematomas, whereas infarctions and calcification were observed in 15 and 14

cases respectively. Retroplacental hematomas were seen in 10 out of 54 cases of mild preeclampsia, 14 out of 36 cases of severe preeclampsia and 5 out of 10 cases of eclampsia. Incidence of infarction and calcification were higher in eclampsia group as per **Table - 3**.

Infants weighing <2.5 kg were more in severe preeclampsia and eclampsia group and they had low Apgar score, needed admission into NICU. In eclampsia group there were 2 stillbirths as per **Table - 4**. One study postulated that extensive placental infarction is associated with fetal hypoxia, intrauterine growth restriction and death [6].

**Table – 2:** Weight of placenta in different study groups.

| Placental weight | Control group | Mild Preeclampsia | Severe Preeclampsia | Eclampsia |
|------------------|---------------|-------------------|---------------------|-----------|
| <300 g           | -             | 6 (11%)           | 10 (28%)            | 5 (50%)   |
| 300-400 g        | 6%            | 20 (37%)          | 16 (44%)            | 4 (40%)   |
| 401-500 g        | 30%           | 24 (44%)          | 6 (17%)             | 1 (10%)   |
| >500 g           | 64%           | 4 (8%)            | 4 (11%)             | -         |

**Table – 3:** Comparison of morphology of placenta in different groups.

| Placental morphology    | Control group | Mild Preeclampsia | Severe Preeclampsia | Eclampsia |
|-------------------------|---------------|-------------------|---------------------|-----------|
| Retroplacental hematoma | -             | 10                | 14                  | 5         |
| Infarction              | 15            | 14                | 10                  | 7         |
| Calcification           | 14            | 16                | 11                  | 6         |

**Table – 4:** Severity of hypertension and neonatal outcome.

| Fetal weight | Control group | Mild Preeclampsia | Severe Preeclampsia | Eclampsia |
|--------------|---------------|-------------------|---------------------|-----------|
| <2.5 kg      | 7%            | 56%               | 74%                 | 80%       |
| >2.5 kg      | 93%           | 44%               | 26%                 | 20%       |

## Discussion

Placenta is regarded as a valuable indicator of maternal and fetal disease and thus examination of placenta provides reflection of hazards foetus has been subjected to during intrauterine growth and development. Placental weight ranges from 400-600 g in uncomplicated pregnancies. Weight

of the placenta is significant as it is related to villus surface area and fetal metabolism (Udainia A, 2004) [4]. In our study, weight of placenta was less in severe hypertension. Londhe Pradeep S and Mane Abhay B, 2011 [5] also observed that placental weight was less in cases of preeclampsia than in controls. One study

reported reduced placental weight in higher grades of hypertension, while placenta from cases of mild preeclampsia was in normal range. One study found the mean placental weight of 435.63 g in mild preeclampsia and 371.43 g in severe preeclampsia [4].

Wide variation in incidence of placental infarcts was reported by Fox H and Langley F ranging from 34% in mild hypertension to 60% in severe hypertension [6]. Wiggleworth JS [7], Brosens I and Raener M [8] highlighted that placental infarcts involving more than 10% surface area were significant. Bandana Das, et al. also have shown an increase in incidence of infarction in hypertensive group. Fox H in 1997 has reported an incidence of 15% retroplacental hematoma [6]. Salvatore CA has reported an incidence of retroplacental hematoma of 3.1% in mild and 25.8% in severe cases [9].

Mohan, et al. have observed an increase in incidence of retroplacental hematomas in severe preeclampsia [10]. Incidence of stillbirth was more with presence of retroplacental hematoma. Bandana Das, et al. found that retroplacental hematomas were associated with low Apgar score and larger haematomas with intrauterine fetal demise because a considerable portion of villi are separated from uteroplacental circulation [3]. Calcification was common in cases of severe preeclampsia and eclampsia.

## Conclusion

In a comparative study, we observed that weight of placenta was directly related to severity of hypertension and placenta which weighed less was associated with higher incidence of low birth weight. Gross lesions like retroplacental hematomas, infarcts and calcification so were more in the hypertensive group which adversely influence the perinatal outcome.

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