

# Fundoscopic Changes in Pregnant Mother with Hypertension Complicating Pregnancy and Various Parameters of Foetus

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## Research Article

**Abstract: Aims:** To observe relationship of fundus changes and various parameters of the foetus in Gestational Hypertension patients **Settings and Design:** A prospective cohort study. **Materials and Methods:** Detailed ocular history and ocular examination including direct fundoscopy was done and findings were noted in hundred patients with Gestational Hypertension. Investigations like urine protein, blood urea, serum uric acid and platelet count were done in all patients. After the delivery foetal outcome was assessed by gestational age, birth weight, 1 minute Apgar score, stillbirth and neonatal death. The chi square test was used to evaluate the association between the various fundus changes and foetal outcome. **Results:** 60% patients were primigravida. Various Fundus changes were observed in 42 % of the Gestational Hypertension patients. The means of systolic and diastolic BP of the subjects with hypertensive fundus changes were **178.07mm of Hg.** with standard deviation of 12.10 and **100.63mm of Hg.** with standard deviation of 12.86 respectively, whereas those values without fundus changes were **146.17mm of Hg.** with standard deviation of 4.94 and **93.13mm of Hg.** with standard deviation of 2.40. Vascular changes without retinal, optic nerve changes did not have any effect on foetal birth weight or Apgar score. Retinal changes were found to be associated ( $P < 0.05$ ) with low birth weight (<2.5 kg) as well as low Apgar score. **Conclusion:** Retinal changes are associated with low birth weight. Fundus evaluation in patients with Hypertensive disorder of pregnancy is an important procedure to predict adverse fetal outcomes.

**Key words:** Gestational hypertension, vascular occlusion, retinopathy, low birth weight, Apgar score.

## Introduction

Gestational Hypertension is a disorder of blood pressure that arises because of presence of pregnancy. The term PIH (Pregnancy Induced Hypertension) is still used by some interchangeably with gestational hypertension<sup>1</sup> & is present if two readings of sitting blood pressure with spacing of four hours are  $\geq 140/90$  mm of Hg. usually during third trimester of pregnancy. It may be associated with proteinuria and / generalized oedema.

Above changes alone are classified as preeclampsia. If seizures develop it is termed as eclampsia.

PIH has an incidence of 5%<sup>2</sup> and the disease can have grave consequences for both mother & foetus. Risk

factors are primigravida, multifoetal pregnancy, too young/old age, multiparity, foetal hydrops, hydatidiform mole, & vascular diseases.

It is postulated that it is due to increased sensitivity to circulating prostaglandins<sup>3</sup> and angiotensin II<sup>4</sup>. This may be due to failure of invasion of cytotrophoblast into the spiral arterioles of the uteroplacental bed<sup>5</sup>. Ocular involvement is common in PIH occurring in as many as 30 -100% of patients<sup>6</sup>.

Most common symptoms are blurring of vision, photopsias, scotomas, diplopia. Visual symptoms may be precursor of seizures<sup>7</sup>.

Various changes seen are

1 Angiospasm – Constriction of retinal arterioles<sup>8,9,10</sup> initially focal on nasal side progressing to generalized narrowing<sup>6,8</sup> These are reversible in most cases<sup>8</sup>

2 Retinal oedema – persistent reduction in perfusion results in retinal oedema<sup>4</sup>

3 Sclerosis – Sclerosis, arteriovenous crossing changes, haemorrhages, cotton wool spots

4 Serous detachment – Usually bilateral. It is exudation from choroid which elevates retina<sup>11</sup>

5 Spontaneous vitreous haemorrhage, retinal neovascularization

6 Optic Neuropathy – Vascular changes in vessels of optic nerve head can occur in PIH resulting in papilloedema, acute ischaemic optic neuropathy, and optic atrophy<sup>9</sup> Cortical blindness – Rare. Total visual recovery is frequent and parallels the resolution of oedema<sup>12</sup>

Progression of retinal changes correlates progression of PIH<sup>13</sup> and foetal mortality due to similar vascular ischaemic changes in placenta.

## Need for study

Low birth weight or prematurity are the causes for Retinopathy of prematurity which is blinding disease.

Early detection of Toxaemic retinopathy in mother may help the obstetrician to manage mother & foetus both.

**Materials & methods**

This study was carried jointly in the departments of Ophthalmology and Obstetrics and Gynaecology between period of March 2013 to June 2013

. This was a prospective cohort study.

**Inclusion criteria** - Patients admitted to the obstetrics ward, KIMSDU, with the diagnosis of PIH.

**Exclusion criteria** - Patients having history of hypertension, cardiovascular disease, collagen vascular disease before pregnancy.

Patients having ocular media opacity which will interfere examination of fundus.

**Method**

After obtaining an informed consent, the baseline data for all the patients were recorded. All the patients were initially evaluated by an obstetrician. Detailed history, general physical examination and systemic examination were then done. Ocular evaluation was done which included bedside visual acuity, torch examination to see ocular alignment and motility, pupillary examination and to exclude gross anterior segment pathology. Fundus evaluation under mydriasis (plain tropicamide 0.5%) was performed. Fundus changes were grouped as: no changes, vascular changes, retinal

oedema, macular oedema, extra-vascular retinal changes (hemorrhages, cotton wool spots, hard exudates), optic nerve head changes and serous detachment. The mode of delivery either vaginal or Caesarean and if vaginal whether spontaneous or induced was noted. Fetal outcomes were evaluated in terms of gestational age, birth weight, 1 minute Apgar score recordings, stillbirth and neonatal death.

**Statistics:** Statistical analysis was performed using a statistical software package (SPSS for windows). Analysis consisted of mean with standard deviation. Various retinal changes and foetal parameters were analyzed by Chi square test.

**Results**

The mean age of the patients with fundus changes was 21.73years with Standard deviation of 2.01. That of those without the changes was 25years with standard deviation of 1.71. The means of systolic and diastolic BP of the subjects with hypertensive fundus changes were **178.07mm of Hg.** with standard deviation of 12.10 and **100.63mm of Hg.** with standard deviation of 12.86 respectively, whereas those values without fundus changes were **146.17mm of Hg.** with standard deviation of 4.94 and **93.13mm of Hg.** with standard deviation of 2.40

**Table 1:** Mean values of different variables

| Variable       | Fundus changes Present |       | Fundus changes absent |      |
|----------------|------------------------|-------|-----------------------|------|
|                | Mean                   | SD    | Mean                  | SD   |
|                | n =42                  |       | n = 58                |      |
| Age            | 21.73                  | 2.01  | 25                    | 1.71 |
| Systolic B.P.  | 178.07                 | 12.10 | 146.17                | 4.94 |
| Diastolic B.P. | 100.63                 | 12.86 | 93.13                 | 2.40 |

Various symptoms came across were headache(35.71%), sudden diminution of vision(DOV 4.76%), blurred vision (7.14%). Symptoms came back to normal within few days after delivery/termination of pregnancy. 52.38% did not have any symptoms.

**Table 2:** Various symptoms observed in mothers

| Symptoms       | No. | Percentage |
|----------------|-----|------------|
| Headache       | 15  | 35.71      |
| Sudden DOV     | 2   | 4.76       |
| Blurred vision | 3   | 7.14       |
| No symptoms    | 22  | 52.38      |

Out of 42 patients having fundus changes 73.80% had **vascular spasm.** In these patients mean systolic B.P. was 171.51mm of Hg. while mean diastolic B.P. was 93.67mm of Hg. 14.28% had **Generalized retinal oedema.** In these patients mean systolic B.P. was 180.66mm of Hg. while mean diastolic B.P. was 97mm of Hg. 9.52% had **Macular oedema.** In these patients mean systolic B.P. was 190.5mm of Hg. while mean diastolic B.P. was 99.42mm of Hg. 2.38% had **Retinal Detachment.** In this patient systolic B.P. was 210mm of Hg. while diastolic B.P. was 100mm of Hg.

**Table 3:** Various fundus changes seen and mean B.P.

| Fundus change       | No. | Percent | Mean systolic B.P. | Mean Diastolic B.P. |
|---------------------|-----|---------|--------------------|---------------------|
| Gen. vascular spasm | 31  | 73.80%  | 171.51mm           | 93.67mm             |
| Gen. retinal oedema | 6   | 14.28%  | 180.66mm           | 97mm                |
| Macular oedema      | 4   | 9.52%   | 190.5mm            | 99.42mm             |
| RD                  | 1   | 2.38%   | 210mm              | 100mm               |

The decision of induction or LSCS was taken for various obstetric indications and uncontrolled hypertension and worsening PIH signs.

Table 4: Mode of termination of pregnancy in patients with fundus changes

| Mode                | No. | Percentage |
|---------------------|-----|------------|
| LSCS                | 22  | 52.4       |
| Vaginal Induced     | 10  | 23.8       |
| Vaginal Spontaneous | 10  | 23.8       |
| Total               | 42  | 100.0      |

Table 5: Mode of termination of pregnancy in patients without fundus changes

| Mode                | No. | Percentage |
|---------------------|-----|------------|
| LSCS                | 30  | 51.7       |
| Vaginal Induced     | 14  | 24.1       |
| Vaginal Spontaneous | 14  | 24.1       |
| Total               | 58  | 100.0      |

Out of 42 patients having fundus changes 23% had preterm delivery, 59.52% had Low Birth Weight(LBW) which is significant ( $P < 0.05$ ) and 23% had 1min. Apgar score  $< 5$  Out of 58 patients without fundus changes 25% had preterm delivery, 8.62% had Low Birth Weight(LBW) and 18.96% had 1min. Apgar score  $< 5$

Table 6: Various foetal outcomes in patients with and without fundus changes

| Foetal outcome             | with fundus changes | %      | without fundus changes | %      | P value  |
|----------------------------|---------------------|--------|------------------------|--------|----------|
|                            | n = 42              |        | n = 58                 |        |          |
| Gestational age $< 37$ wks | 10                  | 23%    | 15                     | 25%    | $> 0.05$ |
| LBW $< 2.5$ Kgs.           | 25                  | 59.52% | 5                      | 8.62%  | $< 0.05$ |
| 1 min.Apgar $< 5$          | 10                  | 23%    | 11                     | 18.96% | $> 0.05$ |

Patients who were having vascular changes alone did not have significant bad foetal outcome. On the contrary patients having retinal oedema, macular oedema and retinal detachment delivered babies who had **LBW (72.72%)** which is significant ( $P < 0.05$ )

Table 7: Various foetal parameters observed according to various fundus changes seen in pregnant mother

| Fundus change       | No. | Gestational age $< 37$ wks | P value  | LBW $< 2.5$ Kgs. | P value  | 1min Apgar score $< 5$ | P value  |
|---------------------|-----|----------------------------|----------|------------------|----------|------------------------|----------|
| Gen. vascular spasm | 31  | 5                          | $> 0.05$ | 14               | $> 0.05$ | 6                      | $> 0.05$ |
| Gen.retinal oedema  | 6   | 3                          | $> 0.05$ | 5                | $< 0.05$ | 2                      | $> 0.05$ |
| macularoedema       | 4   | 1                          | $> 0.05$ | 3                | $< 0.05$ | 1                      | $> 0.05$ |
| RD                  | 1   |                            | $> 0.05$ | 1                | $< 0.05$ | 1                      | $> 0.05$ |

## Discussion

Total 100 patients of pregnancy-induced hypertension (PIH) were included in this study, which included 88 pre-eclamptic patients and 12 eclamptic patients. Hypertensive fundus changes were observed in 42%. This correlates with study by Tadin et al 2001<sup>14</sup> The prevalence of ocular changes in PIH patients as described in literature varies from 30 to 100 %<sup>8,15</sup> Out of the visual symptoms blurred vision is most common followed by photopsia, scotomata and diplopia<sup>16</sup> In our study, we didn't come across any patients complaining of photopsia or scotoma, but 11.90 % had blurred / sudden diminution of vision. Anterior segment examinations including extraocular movements and pupillary responses were normal in all our patients. If we refer Literature it is seen that the progression of retinal vascular changes is a sign of increasing severity of PIH and have correlated them with fetal mortality<sup>12, 17, 18, 19</sup>. Tadin et al (2001)<sup>14</sup> showed

that the degree of hypertensive retinopathy and Apgar score had statistically significant relationship in their study on "Hypertensive retinopathy and pre-eclampsia". Our study showed that presence of fundus changes in a patient of pregnancy-induced hypertension was **significantly associated with low birth weight ( $P < 0.05$ )**, but was not associated with foetal outcome in terms of gestational period (less than 37 weeks), 1 minute Apgar score (less than 5), stillbirth and neonatal death. **Statistically significant relationship was found with fundus findings in the forms of retinal oedema, macular oedema and retinal detachment changes. ( $P < 0.05$ )**. Though reported in literature, vitreous hemorrhage, retinal haemorrhage, soft exudates Purstcher's like retinopathy were not encountered in our study; nor did we find any case of cortical blindness (Prado et al 2002). Our study was having small sample size. We recommend similar study with large sample size so that we can get

more cases for study having extra vascular fundus changes like exudates, haemorrhages, detachment, etc. and see if there is association of low Apgar score or not. As low birth weight is associated with Retinopathy of prematurity PIH patients with fundus changes should be followed up by an Ophthalmologist after delivery also for their babies. Patients & Obstetrician should also be convinced accordingly.

### Conclusion

There is no difference in foetal outcomes in PIH patients with vascular changes alone and those with no fundus changes.

Retinal oedema, macular oedema, retinal detachment are associated with low birth weight. Fundus evaluation in patients with PIH is an important procedure to predict adverse fetal outcomes. Fundus evaluation can be recommended for all patients with pregnancy-induced hypertension, considering the presence of the changes to be an indirect marker of severity of PIH. Pregnant hypertensive mothers having fundus changes should be followed up for their babies because low birth weight is significantly common in these babies and these babies will be screened for Retinopathy of prematurity.

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