# A Descriptive Study of Fundoscopic Changes in Pregnancy Induced Hypertension

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**Abstract**
**Introduction:** *Hypertensive disorders complicating pregnancy are one of the common and significant causes of maternal morbidity and mortality especially in developing countries. They are responsible for 8-9% of maternal deaths in India and 15-20% of maternal deaths in western world. Overall they complicate 5-10% of pregnancies in India.*
**Materials and Methods:** *This study was conducted on patients diagnosed with pre eclampsia in the department of Ophthalmology, M.G.M Medical College, Jamshedpur. The duration of study was from December 2018- June 2019. Cases with pre-existing vascular/renal disease, diabetes, any underlying ocular co-morbidity like glaucoma or cataract, Cases with placental abnormalities, Cases with congenital defects in foetus and eclampsia were excluded.*
**Results:** *In our study, the mean age of the patients was 23.28± 3.37 years. 88% of patients belonged between age groups of 20-29 years.48.86 % of the patients in that age group had retinopathy findings. 6% of patients belonged to patients aged above 30 years and.83.3% of them presented with retinopathy findings. 74% of patients were primigravida and 26% were multigravida.*
**Conclusion:** *Our study reported that common retinal findings was grade 1 hypertensive retinopathy and generalized arteriolar narrowing. Serum uric acid was significantly associated with retinopathy findings. The retinal changes were more often seen in patients with severe hypertension, severe proteinuria and severity of pre eclampsia in our study. Retinal changes was not associated with APGAR score at 1 min but was significantly associated with fetal birth weight.*
**Key Words:** *Hypertensive disorders, retinal findings, APGAR*

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## I. Introduction

Hypertensive disorders complicating pregnancy are one of the common and significant causes of maternal morbidity and mortality especially in developing countries. They are responsible for 8-9% of maternal deaths in India and 15-20% of maternal deaths in western world. Overall they complicate 5-10% of pregnancies in India.[1]

Pregnancy induced hypertension (PIH) is a hypertensive disorder in pregnancy that occurs in the absence of other causes of elevated blood pressure (140/90 mmHg, or arise of 30mmHg of systolic pressure, or a rise of 15mmHg of diastolic pressure), taken on two occasions after rest, in combination with generalized edema and/or proteinuria. [2]

When there is significant proteinuria it is termed as preeclampsia; seizures or coma as a consequence of PIH is termed as eclampsia.[3] The incidence of pr-eclampsia in nulliparous population ranges from 3 to 10 per cent worldwide.3 Incidence of eclampsia in the developed countries is about 1 in 2000 deliveries 4 as compared to developing countries.[4]

where it varies from 1 in 100 to 1 in 1700. The national incidence of PIH is 15.2% in India, while it is four times higher in primipara women than in multipara.8,9 PIH cannot be attributed to single cause as it is multifactorial as disease process.[5]

The disease process affects almost every organ system of body including cardiovascular, renal, endocrine and central nervous system. The changes in the retinal vasculature generally, but not always, correlate with the severity of systemic hypertension. Vasospastic manifestations are reversible and the retinal vessels rapidly return to normal after delivery. There is paucity of data available in the published literature on the prevalence of retinal changes in PIH from India. Therefore, this study was under taken to determine the prevalence of fundoscopic changes in PIH and association between the retinal changes and severity of PIH.[6]

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## II. Materials And Methods

This study was conducted on patients diagnosed with pre eclampsia in the department of Ophthalmology, M.G.M Medical College, Jamshedpur. The duration of study was from December 2018- June 2019. Cases with pre-existing vascular/renal disease, diabetes, any underlying ocular co-morbidity like glaucoma or cataract, Cases with placental abnormalities, Cases with congenital defects in foetus and eclampsia were excluded.

Ethical clearance was obtained from institutional ethics committee. Patients who were willing to give informed written consent were included in the study. A proforma containing detailed information of each patient was designed according to study protocol. Patients underwent ocular examination including detailed clinical history on the presenting day and during antenatal follow up to 6 weeks post partum period.

Patients advised for hospitalization were evaluated at the bedside. Patients were examined for pallor, pedal oedema, pulse, blood pressure and urine protein at the time of ocular examination. Patient's blood pressure was recorded before ocular examination and was carried out during each phase of evaluation. The selected patients retinopathy status, age, and blood pressure will be included for analysis purpose. Anterior segment was examined with torch light on the bed itself. Both pupils were dilated with 1% tropicamide eye drops and fundus examination was done by ophthalmologist with direct ophthalmoscope in a semi dark room in the ward.

The fundoscopic examinations of both eyes were documented. The hypertensive retinopathy was graded and staged according to **KEITH WAGNER classification**:

**Grade 1**: mild-moderate narrowing or sclerosis of the arterioles
**Grade 2:** moderate to marked narrowing of the arterioles, Local and /or generalised narrowing of the arterioles, exaggeration of the light reflex, arteriovenous crossing changes
**Grade 3:** Retinal arteriolar narrowing and focal constriction, retinal edema, cotton wool spots, haemorrhages.
**Grade 4**: as Grade 3, plus papilloedema

The fetal outcome was assessed under birth weight, APGAR score at 1 minute and 5th min, still birth and neonatal death. Proteinuria was tested using dipstix method and was graded as + = 0.3gm/L, ++ =1gm/L, and +++ = 3gm/L**.**

### Statistical analysis

The demographic data was analysed using descriptive statistics and expressed as mean ± standard deviation. Categorical data was analyzed by chi square test. P value of 0.05 or less was considered statistically significant.

## III. Results

One hundred patients with pre eclampsia, who were referred to Department of Ophthalmology, were included in this study. Detailed ocular examination including fundoscopy was done in all patients and results were interpreted.

In our study, the mean age of the patients was 23.28± 3.37 years. 88% of patients belonged between age groups of 20-29 years. 48.86 % of the patients in that age group had retinopathy findings. 6% of patients belonged to patients aged above 30 years and. 83.3% of them presented with retinopathy findings. 74% of patients were primigravida and 26% were multigravida.

28% of our patients complained of pedal edema. 35% patients complained of headache along with pedal edema. 13% complained of blurring of vision. All our patients had good vision on 3 month follow up. 54% had mild preeclampsia while 46% had severe preeclampsia. A mean systolic blood pressure was 156.9±17.96 and mean diastolic blood pressure was 104.88±13.58.

All our cases had normal anterior segment. Out of 100 cases, 50% of cases had no retinopathy findings. Thirty four (34%) patients had grade I hypertensive changes. Grade II and Grade III changes were seen in 13% and 3% respectively. The percentage of patients developing retinopathy due to preeclampsia increased as we moved from mild preeclampsia group to severe preeclampsia. Our study had retinal hemorrhages, a: v nipping of blood vessels, silver wiring, and cotton wool spots. We did not encounter any cases of retinal detachment, vitreous haemorrahage or cortical blindness.

All patients had proteinuria of varying severity ranging from 1+ to 4+ with patients with severe proteinuria of 4+ having greater chance of developing retinopathy. It was significantly associated with retinopathy with p value <0.05. In this study, it was found that the value blood urea ranged from 10-34 mg% with mean value of 18.7 and 19.7 mg% in mild and severe preeclampsia. Serum uric acid levels ranged from 2.5- 11.0 in mild preeclampsia and 2.7-9 mg% in severe preeclampsia is also increased. The mean value was 5.76mg% and 5.60 mg%.

The fetal outcomes to pre eclamptic mother were also assessed. The mean birth weight was 2300.20±616.75. Fetal birth weight was less than 2500g of 63 of mothers, out of which 69 mothers, 39 of them had retinopathy changes. Birth weight and retinopathy were significantly associated with p value of 0.002.

| Variables | Mean±SD |
|---|---|
| Age | 23.28± 3.37 |
| Systolic blood pressure | 156.9±17.961 |
| Diastolic blood pressure | 104.88±13.58 |
| Blood urea levels | 19.29±5.87 |
| Serum uric acid levels | 5.69±1.77 |

**Table 1: Demographic characteristics**

| Variables | Mean ± SD |
|---|---|
| Birth weight | 2300.20±616.75 |
| Apgar score at 1 min | 6.63±2.34 |
| Apgar score at 5th min | 8.5±2.95 |

**Table 2: Mean Birth weight**

There was statistical association between retinal changes and blood pressure, proteinuria and fetal outcome. The association between retinal changes and different parameters is shown in tables:

| Protienuria | No of patients | Percentage | Retinopathy (%) | P value |
|---|---|---|---|---|
| + | 65 | 65% | 30(46.8%) | 0.03 |
| ++ | 25 | 25% | 10(40%) | |
| +++ | 7 | 7% | 7(100%) | |
| ++++ | 3 | 3% | 3(100%) | |

**Table 3: Proteinuria and association with retinopathy**

| Grades | No of patients | Percentage |
|---|---|---|
| No retinopathy changes | 50 | 50% |
| Grade 1 retinopathy | 34 | 34% |
| Grade 2 retinopathy | 13 | 13% |
| Grade 3 retinopathy | 3 | 3% |
| Grade 4 retinopathy | 0 | 0 |

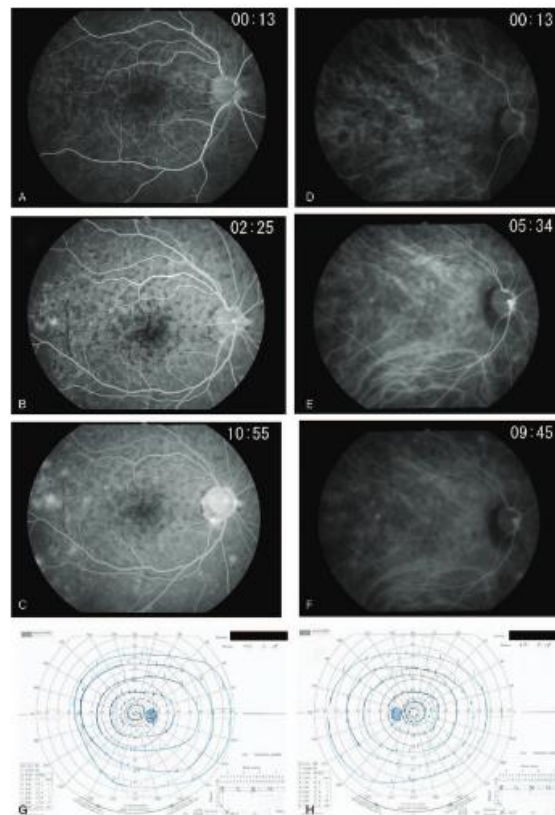**Table 4: Fundus changes according to grades of retinopathy**
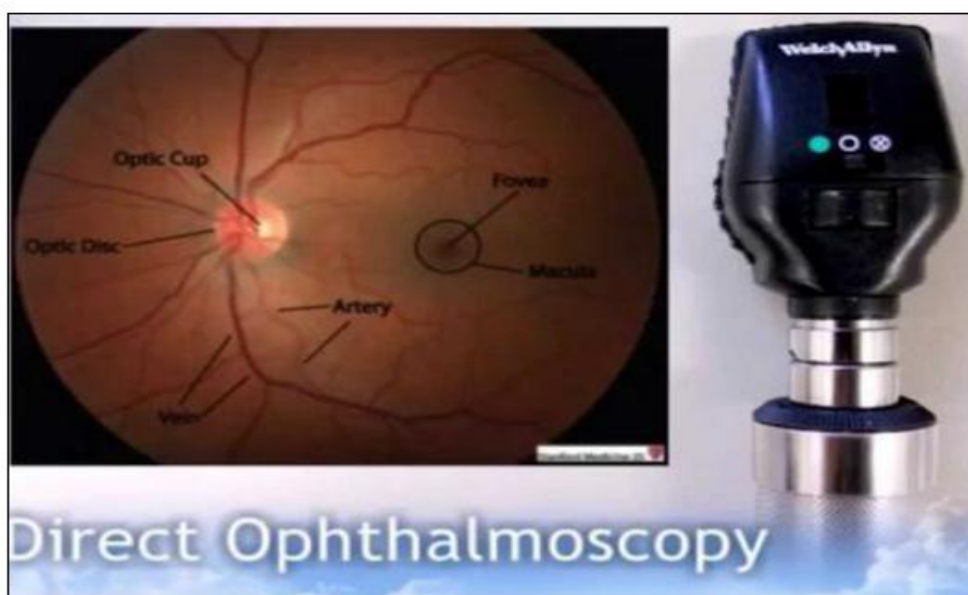


(Shah *et al.*, 2015) [11]

**Figure 1: Direct Ophthalmoscopy**
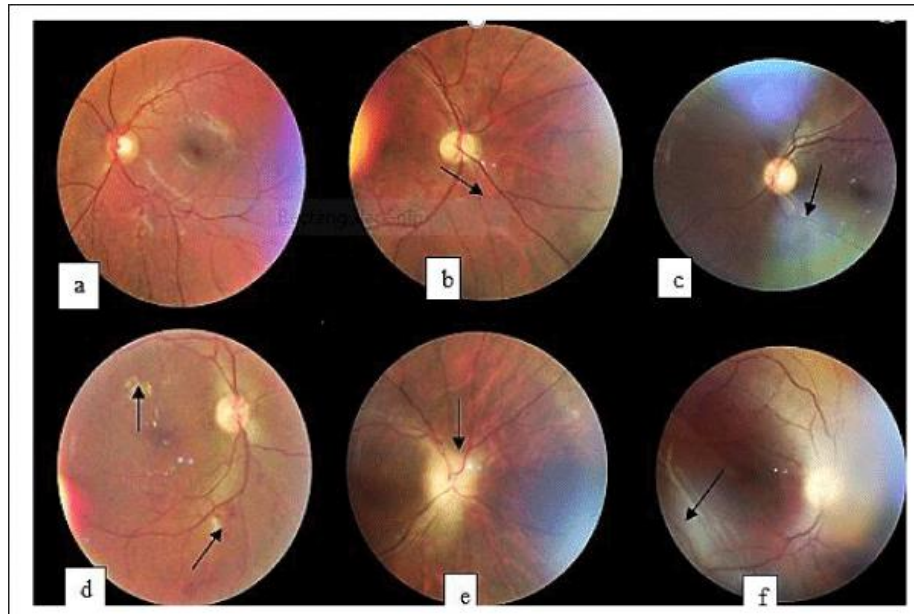
**Figure 2: Showing a) Normal Fundus. b) Generalised arteriolar attenuation- Stage I. c) A-V crossing changes- Stage II. d) Superficial Haemorrhages and hard exudates- Stages III. e) Papilledema-Stage III. f) Serous RD-Stage III. Of patients studied.**



**Figure 3: Angiographic findings of the right eye at 13 days after delivery, and visual field findings at 97 days after delivery. FA images show normal filling of retinal circulation in the early phase (A), multiple hypofluorescent spots and a few hyperfluorescent spots in the mid phase (B) and dye poolings at the hyperfluorescent spots during the late phase (C). ICGA images demonstrate normal filling of choroidal circulation in the early phase (D), and multiple hypofluorescent spots corresponding to the hypofluorescent spots observed on FA in the mid phase (E) and late phase (F). Central scotomas and expansion of Marriott's blind spots were not detected by GP in the right eye (G) and left eye (H). FA=fluorescein angiography, GP=Goldmann perimetry, ICGA=indocyanine green angiography.**

### IV. Discussion

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Mean age of the patients in our study was 23.28± 3.37 years and 88% of the patients were between the age groups of 20-29 and 6% were aged between 30-35 years who had retinopathy findings of 48.8% and 83.3% respectively. In Tadin et al study, out of 40 women with pre-eclampsia 45% showed abnormalities of the fundus. The average age was 29.1 years.[4] Studies have shown those in younger and older age groups are associated with higher risk factors for developing pre eclampsia.[7]

In the our study, 35% of patients had headache as one of the complaints while 14% of patients complained of visual symptoms like blurred vision and diplopia. In our study no patients presented with symptoms of flashes of light or black spot in visual field. Visual disturbances such as scotoma, diplopia and dimness of vision are seen in 30-50% of patients with eclampsia and 20-25% of patients with pre eclampsia.[8] Ober RR has reported that headache has long been known to be harbinger of eclamptic convulsions.[9] Belfort MA concluded that headache is most common symptom among patients with preeclampsia.

In our study there was association between blood pressure and retinopathy changes, especially in severe preeclampsia patients.this was also observed in studies by Tandin et al and Vanden Born et al.[10]

Our data contradicted Gupta et al, Kaliaperumal et al and Rasdi et al,studies who reported that severity of retinopathy might be independent of systemic blood pressure.

Visual system are affected in 30-100% of patients with preeclampsia. Visual symptoms are few in patients with preeclampsia and often absent unless macula is involved. In our study, 98% of patients had visual acuity of 6/6 and 2% had vision of 6/9. All the patients gained vision of 6/6 during postnatal follow up. There was no patient with visual acuity of 6/12 or worse during all assessment period.11

In Karki e al study, 153 cases did not show any signs of visual disturbances. Most of them had visual acuity between 6/6 to 6/9.12 In A.R Rasdi study, 96.7% of patients had visual acuity of 6/6 in both eyes and 3.3% had visual acuity of 6/9.

## V. Conclusion

Our study was conducted on 100 diagnosed cases of preeclampsia. Fundoscopy of retina is a simple, non invasive, safe and reliable procedure to interpret the vascular changes.

Our study revealed that a retinopathy change was more common in primigravidae and older age group. Headache was the most common symptom encountered. Systolic and diastolic blood pressures were both significantly associated with retinopathy.

Our study reported that common retinal findings was grade 1 hypertensive retinopathy and generalized arteriolar narrowing. Serum uric acid was significantly associated with retinopathy findings. The retinal changes were more often seen in patients with severe hypertension, severe proteinuria and severity of pre eclampsia in our study. Retinal changes was not associated with APGAR score at 1 min but was significantly associated with fetal birth weight.

Our findings suggest the degree of hypertensive retinopathy in women with preeclampsia is a valid and reliable prognostic factor that gives valid prognostic information on assessment of the severity of pre eclampsia and neonatal outcome

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