

# Pregnancy Induced Hypertension and Retinopathy

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DOI: <https://doi.org/10.52403/ijrr.20230603>

## ABSTRACT

**AIM AND OBJECTIVES:** The aim of this study is to determine the prevalence of retinal changes in pregnancy induced hypertension and to find out its association with severity of hypertension and proteinuria.

**MATERIAL AND METHODS:** A total of 94 pregnant females presented with pregnancy induced hypertension were included in this study. Patients with pre-existing hypertension, coexisting diabetes mellitus, severe anemia, connective tissue disorders were excluded from the study. Detailed fundus examination done and results were interpreted.

**OBSERVATION:** Out of 94 patients with pregnancy induced hypertension, 41.5% belongs to 26-28 years of age. 59.65 were primigravida. Headache was common complaint with 27.6% followed by blurred vision. Among the participants, 52.1% having systolic blood pressure of 150 to 159mmHg presented with fundus changes and 45.8% having diastolic pressure of more than 110mmHg presented fundus finding. In fundus finding, 51.0% presented with hypertensive retinopathy. Among hypertensive retinopathy, 43.8% cases were Grade I, 39.6% cases were Grade II, 12.5% cases were Grade III, 4.1% cases were Grade IV. Grade I and Grade II found to be common. Our study shows statistically significant relationship with severity of hypertension and retinal changes ( $p < 0.05$ )

**CONCLUSION:** The study concluded that there is a positive correlation of fundus changes with severity of hypertension and grades of proteinuria. There is positive association with severity of hypertension, blood urea levels,

serum uric acid level. So regular ophthalmic examination is mandatory in assessing the vascular changes in retina and helps in follow up the patients postpartum to prevent the complications.

**KEYWORDS:** Pregnancy induced hypertension, Hypertensive retinopathy, proteinuria.

## INTRODUCTION

Pregnancy is a physiological state. It is associated with both physiological and pathological changes in the body. The most common pathological change is pregnancy induced hypertension, which affects hormonal, cardiovascular, metabolic, hematological and immunological system.<sup>[1]</sup> Pregnancy affects both structure and function of retinal vasculature. Every system and organ in the body, including the eye and visual system from visual pathway to cortex, are impacted by the complication of preeclampsia. Retinal vascular changes are more common in Hypertensive disorders, which are reversible and return to normal following delivery.

Pregnancy-induced hypertension is the most frequent complication in pregnancy, increases the risk of mortality and morbidity for both the mother and the foetus.<sup>[2]</sup> According to WHO, 14% of maternal death are caused by hypertensive disorders in pregnancy.<sup>[3]</sup> Five to ten percent of pregnancies are complicated by hypertensive disorders. Ocular complication

accounts for 30-100% in PIH.<sup>[4]</sup>

Pregnancy induced hypertension is defined as elevated blood pressure without any other cause with systolic BP of 140mmHg and diastolic BP of 90mmHg measured 2 times each six hours apart in pregnant woman who is normotensive before 20 weeks of gestation with significant proteinuria.

Hypertensive disorders in pregnancy are classified as<sup>[5]</sup>

1. Chronic preexisting hypertension
2. Gestational hypertension
3. Pre-eclampsia
4. Eclampsia
5. HELLP syndrome

There is occurrence of spontaneous vitreous hemorrhage in patients presenting with HELLP syndrome (Hemolysis, Elevated liver enzymes, Low platelet count). The ocular findings seen in PIH are Conjunctival vascular anomalies, Hypertensive retinopathy, exudative retinal detachment, vitreous hemorrhage, pre retinal hemorrhage, ischemic optic neuropathy, hypertensive choroidopathy, central serous retinopathy.<sup>[6]</sup> All signs and symptoms including visual acuity are reversible with appropriate PIH management. The complications are prevented by periodic fundus examination and follow up. The progression of retinal abnormalities is correlated with the progression of PIH, maternal outcome and foetal mortality which is caused by same vascular ischemic changes in the placenta. This study was undertaken to study the retinal changes in correlation to severity of hypertension.

#### **AIMS AND OBJECTIVE**

1. To determine the prevalence of retinal changes in pregnancy induced hypertension
2. To study the relationship between retinal changes and severity of hypertension.
3. To find the association between retinal changes in PIH with proteinuria.

#### **MATERIALS AND METHODS**

A total of 94 pregnant females presented with pregnancy induced hypertension were

included in this study. Patients with pre-existing hypertension, coexisting diabetes mellitus, severe anemia, connective tissue disorders were excluded from the study.

Their age, gravida, gestational age were noted. Relevant ocular history noted. Visual acuity, anterior segment examinations were done. Fundus examination done after pupillary dilatation with tropicamide 0.5% eye drops. Fundus picture taken wherever possible. Blood pressure were recorded. Routine urine analysis to grade proteinuria, blood urea levels, serum uric acid levels were noted. The study was done to assess the correlation of fundus findings with severity of hypertension, grades of proteinuria, blood urea and serum uric acid levels.

Grading of retinopathy done using Keith Wagener classification

Grade I: mild generalized arterial attenuation, especially small branches.

Grade II: more severe grade I and focal arteriolar attenuation

Grade III: grade II and hemorrhages, hard exudates, cotton wool spots.

Grade IV: grade III with optic disc swelling (papilledema).

#### **STATISTICAL ANALYSIS**

The data collected and analysed using SPSS software version 26. Chi Square test was used to compare the retinal changes, severity of hypertension and proteinuria. A P value of less than 0.05 was considered as statistically significant.

#### **RESULTS**

Out of 94 patients examined, maximum number of PIH cases (41.5%) were present in 26-28 years of age (Table 1). 59.6% of the cases were primigravida (Table 2). Headache was the common symptom in 27.6% followed by blurring of vision (Table 3). Among the patients, they presented with fundus findings of normal (39.3%), Hypertensive retinopathy (51.0%), exudative retinal detachment (3.2%), macular edema (3.2%), CSCR (1.1%). Hypertensive retinopathy was graded.

Among hypertensive retinopathy, 43.8% cases were grade I, 39.6% cases were grade II, 12.5% cases were grade III, 4.1% cases were grade IV. Grade I and Grade II found to be common (Table 5). Among the participants, 52.1% were present with systolic blood pressure of 150 to 159mmHg and 45.8% were presented with diastolic pressure of more than 110 mmHg (Table 6 and Table 7). 50% of the participants had grade 1+ proteinuria, 35.1% had 2+, only 14.9% had 3+ proteinuria (Table 8). Blood urea levels in hypertensive retinopathy shows a mean value of 27.35mg%. Mean value of serum uric acid was 5.86mg/dl in

hypertensive retinopathy. From the observation made from the study, Hypertensive retinopathy (51.0%) was the common ocular complication seen in pregnancy induced hypertension. The study showed positive correlation between fundus findings and severity of hypertension with P value less than 0.05. There is statistically significant relationship between fundus changes, severity of hypertension, proteinuria with P value less than 0.05. The percentage of hypertensive retinopathy in PIH patients was proportional to severity of hypertension.

**Table 1: Distribution according to age**

Age group (In years)	Frequency (n=94)	Percentage (%)
20-22	15	16
23-25	24	25.5
26-28	39	41.5
>28	16	17

**Table 2: Distribution according to gravida**

Gravida	Frequency (n=94)	Percentage (%)
Primi	56	59.6
Multi	38	40.4

**Table 3: Distribution according to symptoms**

Symptoms	Frequency (n=94)	Percentage (%)
Blurred vision	6	6.4
Head ache	26	27.6
Nil	62	66

**Table 4: Distribution according to vision**

Vision	Frequency (n=94)	Percentage (%)
>6/60	89	94.7
>5/60	2	2.1
>4/60	3	3.2

**Table 5: Distribution according to grading of hypertensive retinopathy**

Grade of hypertensive retinopathy	Frequency (n=48)	Percentage (%)
Grade I	21	43.8
Grade II	19	39.6
Grade III	6	12.5
Grade IV	2	4.1

**Table 6: Association between systolic blood pressure and fundal changes**

Systolic blood pressure (in mmHg)	Hypertensive retinopathy		Others*		Normal		X <sup>2</sup>	P value
	N	%	N	%	N	%		
<140	0	0	2	22.2	10	27	40.68	0.001
140-149	18	37.5	2	22.2	26	70.3		
150-159	25	52.1	5	55.6	1	2.7		
>159	5	10.4	0	0	0	0		

\*others – exudative RD, macular edema, CSR, myopic fundus and PED.

Table 7: Association between diastolic blood pressure and fundal changes

Diastolic blood pressure (in mmHg)	Hypertensive retinopathy		Others*		Normal		X <sup>2</sup>	P value
	N	%	N	%	N	%		
80-89	5	10.4	2	22.2	11	29.7	26.83	0.001
90-99	18	37.5	2	22.2	25	67.6		
100-109	3	6.3	1	11.1	0	0		
≥110	22	45.8	4	44.4	1	2.7		

\*others – exudative RD, macular edema, CSR, myopic fundus and PED.

Table 8: Association between proteinuria and fundus changes

Proteinuria	Hypertensive retinopathy		Others*		Normal		X <sup>2</sup>	P value
	N	%	N	%	N	%		
1+	12	25	2	22.2	33	89.2	42.01	0.001
2+	27	56.3	3	33.3	3	8.1		
3+	9	18.8	4	44.4	1	2.7		

\*others – exudative RD, macular edema, CSR, myopic fundus and PED

## DISCUSSION

In our study conducted in 94 patients, 51.0% present with hypertensive retinopathy. Grade I and Grade II being the common with percentage of 43.8% and 39.6% respectively. This is similar to study observed by S C Reddy et al where he found 59% of Grade I hypertensive retinopathy.<sup>[7]</sup> 59.6% are primi and 40.4% were multigravida as compared to Mithila et al proving PIH is more common in primigravida.<sup>[8]</sup> Headache being the most common symptom followed by blurring vision. Other symptoms associated with PIH are scotoma, diplopia, photopsia, cortical blindness. As compared to Shah et al and Reddy et al our study did not present any case of cortical blindness. 89% patients had visual acuity of more than 6/60 as compared to A R Rasdi showed 96.7% with normal visual acuity.<sup>[9]</sup> In our study, 41.5% belongs to age group of 26-28 years. In study conducted by Karki P et al<sup>[10]</sup> showed mean age of 23.86±5.51. The most common and initial finding seen is spasm of retinal arterioles. Others include focal or generalized constriction, Arteriovenous crossing, hemorrhages, cotton wool spot and exudates. Optic disc swelling seen in grade IV hypertensive retinopathy. Our study showed 52.1% develop hypertensive retinopathy with systolic blood pressure of 150-159mmHg and 45.8% showed diastolic BP of more than 110mmHg. This is comparative to study done by Nathe et al showed among 23 patients with BP>160/100mmHg, 10 developed retinopathy.<sup>[11]</sup> In our study 2 cases (4.1%)

present with papilledema. Exudative retinal detachment is rare in PIH. Our study presented 3 cases of exudative retinal detachment. Exudative retinal detachment, macular edema mostly present in the group with systolic BP of 150-159mm Hg and diastolic BP of more than 110 mmHg. 56.3% of hypertensive retinopathy present with 2+ proteinuria followed by 25% with 1+proteinuria. Tadin et al showed positive correlation between proteinuria and hypertension.<sup>[12]</sup> The blood urea level showed mean value of 27.35mg/dl in hypertensive retinopathy with p value less than 0.05. Our study showed statistically significant relationship between severity of hypertension and retinopathy changes, proteinuria and blood urea level with p value less than 0.05.

## CONCLUSION

Various ocular and retinal changes are present in pregnancy induced hypertension. Our study concluded that the presence of retinal changes is proportional to systolic BP, diastolic BP and proteinuria. These changes are reversible and return to normal after delivery. Regular ophthalmoscopic examination is essential to detect the retinal vascular change and helps in close follow up of the patients to detect and prevent the complications.

### Declaration by Authors

**Ethical Approval:** Approved

**Acknowledgement:** The authors would like to acknowledge the contributions made by the Professors and staff members of

Ophthalmology and Obstetrics and Gynaecology, Rajah Muthiah Medical College and Hospital towards the conduct of study. We like to thank the all study participants.

**Source of Funding:** None

**Conflict of Interest:** The authors declare no conflict of interest.

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How to cite this article: Aishwarya R M, Manavalan S, Ramya M et.al. Pregnancy induced hypertension and retinopathy. *International Journal of Research and Review*. 2023; 10(6): 15-19.  
DOI: <https://doi.org/10.52403/ijrr.20230603>

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