



## Original Research Article

## Study of fundus findings in pregnancy induced hypertension

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## ABSTRACT

**Aim:** To evaluate the prevalence of fundus changes in pregnancy induced hypertension and to assess the correlation between fundus changes and severity of pregnancy induced hypertension, age and parity of the patients.

**Materials and Methods:** 100 patients admitted with pregnancy induced hypertension were included. Pre-existing diabetes mellitus, hypertension, renal disease, anaemia, connective tissue disorders, and high myopia, lens and corneal opacities were excluded.

Age and gravida were noted. Vision was recorded and anterior segment examined.

Dilated fundus was examined. Blood pressure, proteinuria, serum uric acid and blood urea levels were noted. Hypertensive retinopathy were graded by using the Keith Wagner Barker classification.

**Observation:** Most of PIH cases (66%) were found in the age group of 21–25 years with mean age=24.32 ± 2.835 years. 70% of the cases were seen in primigravidas and 30% were multigravida. 75% patients of mild preeclampsia, 20% patients of severe preeclampsia and 5% of eclampsia. 38% patients had normal fundus findings and the rest 62% patients had hypertensive retinopathy, 32% had grade 1 hypertensive retinopathy, 21% had grade 2, 5% had grade 3 and 4% of the cases had grade 4 hypertensive retinopathy. Fisher's exact test was done. Study showed positive correlation between fundus findings and severity of PIH (P value 0.000). There was no correlation of fundus findings with age or parity of the patient.

**Conclusion:** Fundus examination plays an important role in all patients with PIH.

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## 1. Introduction

Pregnancy induced hypertension (PIH) is one of the most common medical problem in pregnancy, affecting 7–10% of all pregnancies.<sup>1</sup>

Pregnancy can affect from anterior segment to the visual cortex in the visual pathway. Ocular involvement in PIH is common and the occurrence rate varies from 30-100% in different studies.<sup>2</sup> Since, termination of pregnancy is indicated in severe hypertensive retinopathy.<sup>3</sup> Evaluation of fundus is crucial in all patients of PIH.

PIH consists of gestational hypertension, preeclampsia, eclampsia.<sup>4</sup> Gestational hypertension, the development of a blood pressure of 140/90mm of Hg or more after 20

weeks of gestation without proteinuria. Preeclampsia is elevated blood pressure (140/90 mmHg, or increase of 30mmHg of systolic pressure, or increase of 15mmHg of diastolic pressure), after 20 weeks of gestation taken on two times after 6 hours, with/without pedal edema and/or proteinuria(+1). When it is associated with significant proteinuria, epigastric pain, visual disturbances, liver dysfunction, CNS disturbances it is known as severe preeclampsia; seizures or coma with severe pre eclampsia is known as eclampsia.<sup>5</sup>

The worldwide incidence of pre-eclampsia in nulliparous women from 3 to 10 percent.<sup>6</sup> Incidence of eclampsia in the developed countries is about 1 in 2000 deliveries 4 in developing countries.<sup>7–9</sup> In India, incidence of PIH is 15.2%. The incidence in primigravida is 10% and

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in multigravida is 5%.<sup>10,11</sup> PIH cannot be attributed to single cause as it is multifactorial. Theories include immunological mechanisms, genetic predisposition.

PIH affects ocular, cardiovascular, renal, endocrine and central nervous system almost every organ system of body. Vasospastic changes are reversible and vasospasm of the retinal vessels become normal after delivery.<sup>5</sup>

Visual system involvement is due to the severe toxemia. The most common abnormality seen is a spasm and narrowing of the retinal vessels.<sup>12</sup>

Most of the changes in the retina remains undiagnosed.

## 2. Materials and Methods

Cross sectional, observational study was done on 100 patients admitted with pregnancy induced hypertension in department of obstetrics and gynaecology of J A Group of hospitals from January 2018-June 2019. Pre-existing diabetes mellitus, hypertension, anaemia, connective tissue disorders blood dyscrasias, and high myopia, lenticular and corneal opacities were excluded.

The purpose of the study were explained in all patients and an informed consent was taken. Age, obstetric profile, systolic and diastolic blood pressure, proteinuria were noted. Relevant ocular history and examination was done. Pupils were dilated by 1% tropicamide eye drop. Systemic examination was done to rule out other co-morbidities. Routine urine examination was done. Urine dipstick method was used.

Biochemical investigations including cbc, liver function test, renal function test, urine routine and 24 hours urine for protein, coagulation profile were done.

Detailed fundus examination was done by using indirect ophthalmoscope. Grading of the fundus changes (hypertensive changes) were done by THE KEITH WAGNER BARKER CLASSIFICATION

Group I: Minimal constriction of retinal arterioles with some tortuosity in patients with mild hypertension.

Group II: group I with definite focal narrowing and arteriovenous nicking in patients with minimal or no other systemic involvement.

Group III: group II with haemorrhages, exudates and vasospastic changes including arteriolar attenuation and cotton wool spots many of these patients have identifiable cardiac, cerebral or renal dysfunction.

Group IV: group III with optic disc edema, cardiac, cerebral or renal disease are more severe.

The severity of PIH was classified into preeclampsia (mild and severe) and eclampsia, based on the following findings:

Mild preeclampsia — BP > 140/90mmHg, mild edema of legs; and/or proteinuria+1,

Severe preeclampsia — BP >160/110mmHg, cerebral, visual disturbances headache, epigastric pain, LFT dysfunction, and raised serum creatinine, uric acid and blood urea

proteinuria ++ or +++;

Eclampsia —severe preeclampsia +seizures.

Proteinuria was assed using dipstix method.

The results were processed by using SPSS program. Chi-square test (fisher exact) was used. A value P <0.05 was taken as significant.

## 3. Results

100 patients were examined; most of PIH cases (66%) were found in the age group of 21–25 years. The mean age of patients was  $24.32 \pm 2.8$  years. 70% were primi gravida, 30% were multi gravida. 75% of mild preeclampsia, 20% of severe preeclampsia and 5% patients of eclampsia. Hypertensive retinopathy were found in 62% patients, remaining 38% had normal fundus. Grade 1 hypertensive retinopathy changes were found in 32% patients, Grade 2 changes were found in 21%, Grade 3 were found in 5% and grade 4 changes were found in 4%. (Table 1) Fundus changes found in all the 100 cases and the severity of hypertension was correlated and Fisher's exact test was done. P value was found (0.000), showing the positive correlation between them. There is more chance of the patient having abnormal fundus finding as the severity of hypertension increases. (Table 2)

The different fundus findings and age of the patients were compared, P value was 0.889, which is statistically insignificant. This showed that there is no correlation between the age of the patient and their fundus findings. (Table 3)

Parity and fundus findings were compared, P value from Fisher's exact test was 0.107. Hence, the fundus findings had no correlation with parity. (Table 4)

Grade +1 proteinuria were seen in 56% patients, Grade +2 were seen in 35% and only 9 patients of grade +3proteinuria. Fundus changes found and grade of proteinuria were correlated. Fisher's exact test was done. P value was 0.000, which showed positive correlation between the two. There is more chance of abnormalities in the fundus with increasing degrees of proteinuria

## 4. Discussion

PIH is a hypertensive disorder with multisystem involvement, that affects 3-5% of pregnancies.<sup>13,14</sup> The various pathological changes in different organs of the body can be studied by directly visualizing the ocular fundus and may give a true index of changes in vascular system of brain and retina in PIH.<sup>15</sup>

100 cases, most of cases (66%) were in the age group of >20-25 years, 20% cases were seen between the age group of 26-30 years, 9% cases of age  $\leq 20$  years and the rest 5% patients of >30 years with mean age  $24.32 \pm 2.8$  years.

In a study done by N. Rama Bharathi et al<sup>16</sup> majority of cases 76.66% were in the 21-30 years group similar to

**Table 1:** Distribution of patients according to age, gravida, severity of PIH and fundus finding

Age (Years)	Number of Patients	Percentage (%)
≤ 20 years	9	9
>20 -25 years	66	66
>25-30 years	20	20
>30 years	5	5
Gravida		
Primigravida	70	70
Multigravida	30	30
Severity of PIH		
Mild preeclampsia	75	75
Severe preeclampsia	20	20
Eclampsia	5	5
Fundus finding		
Normal	38	38
Hypertensive retinopathy	62	62
Grade of retinopathy		
Grade 1	32	32
Grade 2	21	21
Grade 3	5	5
Grade 4	4	4
Total	100	100

**Table 2:** Correlation of fundus findings with severity of PIH

Fundus Finding	Mild preeclampsia SBP<160 DBP<110		Severe preeclampsia SBP≥160 DBP≥110		Eclampsia SBP≥160 DBP≥110 +Seizures		Total		P Value
	N	%	N	%	N	%	N	%	
Normal	38	50.7	0	0	0	0	38	38	0.00*
Grade 1	22	29.3	10	50.0	0	0	32	32	
Grade 2	13	17.3	7	35	1	20	21	21	
Grade 3	2	2.7	2	10	1	20	5	5	
Grade 4	0	0	1	5	3	60	4	4	
<b>Total</b>	<b>75</b>	<b>100</b>	<b>20</b>	<b>100</b>	<b>5</b>	<b>100</b>	<b>100</b>	<b>100</b>	

PIH= Pregnancy induced hypertension.

**Table 3:** Correlation of fundus findings with age group

Fundus finding	Age(Years)								Total		P Value
	<_20 years		>20-25 years		>25-30 years		>30 years		N	%	
	N	%	N	%	N	%	N	%			
Normal	3	33.3	27	41	6	30	2	40	38	38	0.889
Grade 1	3	33.3	21	32	6	30	2	40	32	32	
Grade 2	2	22.2	12	18.1	6	30	1	20	21	21	
Grade 3	0	0	3	4.5	2	10	0	0	5	5	
Grade 4	1	11.1	3	4.5	0	0	0	0	4	4	
<b>Total</b>	<b>9</b>	<b>100</b>	<b>66</b>	<b>100</b>	<b>20</b>	<b>100</b>	<b>5</b>	<b>100</b>	<b>100</b>	<b>100</b>	

**Table 4:** Correlation of fundus findings with parity

Fundus finding	Gravida				Total		P Value
	Primigravida		Multigravida		N	%	
	N	%	N	%			
Normal	21	30	17	56.6	38	38	0.107
Grade 1	27	38.6	5	16.6	32	32	
Grade 2	15	21.4	6	20	21	21	
Grade 3	3	4.3	2	6.6	5	5	
Grade 4	4	5.6	0	0	4	4	
Total	70	100	30	100	100	100	

present study. In a study done by Varija T et al<sup>17</sup> Majority of cases 79.6% were in the age group of 20-25 years, that also favours present study. This result could be because of more number of pregnant women tend to fall in to this age group.

In present study 70% of the cases were primigravidae and 30% cases were multigravidae. Though PIH as found more in primigravidae, but present study donot showed association between fundus findings and the parity of patients. P value 0.107 (insignificant)

In a study done by N. Rama Bharathi et al, 70% of the cases were primigravidae, similar to present study.

Varija T et al, 66.7% were primigravidae similar to present study.

In a study done by Reddy et al,<sup>18</sup> 43.5% of the cases were primigravidae, less than the present study.

In the present study, 75% of the cases studied of mild preeclampsia, 20% of severe preeclampsia and the 5% of eclampsia, there was no patient of gestational hypertension in the present study. Maximum cases of mild preeclampsia found, could be due to good antenatal medical check up.

In the study done by Tadin et al<sup>19</sup> from Croatia 55% of mild preeclampsia, 25% of severe preeclampsia and 20% of eclampsia, similar to present study.

In a study done by N.Rama Bharathi et al 11.33% of gestational hypertension, 48.66% of mild preeclampsia, 24.66% of severe preeclampsia and 15.33% of eclampsia, similar to present study.

In a study done by Reddy et al 38.5% patients of mild preeclampsia, 59% patients of severe preeclampsia and 2.5% patients of eclampsia. Max cases of severe preeclampsia were found. This could be due to lack of awareness of antenatal check up among the patients.

In present study retinal changes were found in 62% of the patients. Present study show positive association of fundus finding with severity of pregnancy induced hypertension. There is more chance of the patient having abnormal fundus finding as the severity of pregnancy induced hypertension increases. In the study done by Reddy includes 78 patients with PIH showed prevalence rate of 59%.

Tadin et al from Croatia, he found 45% of retinal changes in their study on 40 patients with PIH.

In a study done by N. Rama Bharathi et al, The prevalence rate of fundus changes was 23.33% lesser than the present study but showed positive correlation with blood pressure and severity of disease of hypertensive retinopathy.

In a study done on 275 cases of preeclampsia and 125 cases of eclampsia by Reddy,<sup>20</sup> he found retinal changes in 53.4% preeclampsia and in 71.2% in eclampsia patients. The most common fundus finding, they found was narrowing of arterioles(45.7%).

In the present study hypertensive retinopathy was the most frequently noticed finding seen in 62% of the patients. Grade 1 hypertensive retinopathy changes were found in 32% patients, Grade 2 changes were found in 21 %, Grade 3 were found in 5% and grade 4 changes were found in 4%of patients.

Proteinuria is an important sign of pre eclampsia. The minimum criteria for diagnosis of preeclampsia are hypertension and proteinuria which may be minimal or severe. In present study, all 100 patients had proteinuria and it ranged from 1+ to 3+. Patients with severe proteinuria (3+) have greater chance of developing retinopathy than less severe proteinuria. There was significant association between fundus finding and proteinuria with P value of 0.00 (significant).

The present study suggests a positive correlation between fundus findings, severity of hypertension and grades of proteinuria. This is similar to the study done by Tadin et al where he reported that the degree of retinopathy was directly proportional to severity of preeclampsia and proteinuria. Their study stated that hypertensive retinopathy is the prognostic factor in determining the severity of preeclampsia and that examination of fundus is a valuable and also plays an important role diagnosis in preeclampsia.

## 5. Conclusion

Grade 1 and 2 hypertensive retinopathy is the most common fundus change seen in PIH patients. Less commonly, grade 3 and 4 hypertensive retinopathy is noted. The present study showed a positive correlation with the severity of pregnancy included hypertension and proteinuria. But there was no correlation found between the age and parity of the patient and fundus finding. Examination of the retina is crucial

in all cases of pregnancy induced hypertension. It is an indicator of the severity of hypertension and fundus finding and plays an important role in determining the termination of pregnancy.

## 6. Source of funding

None.

## 7. Conflict of interest

None.

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