

Role of Fundoscopy Changes for Predicting Adverse Perinatal Outcome in Pregnancy Induced Hypertension

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Abstract

Introduction: Pregnancy induced hypertension (PIH) is a disorder of blood pressure (BP) that arise because of the presence of pregnancy. This can have grave consequences for both mother and fetus. The purpose of the present study is to determine the prevalence of retinal changes in PIH and any association between the retinal changes and fetal outcomes.

Aims: This study was undertaken to evaluate the role of fundoscopy changes for predicting adverse perinatal outcome in Pregnancy induced hypertension.

Materials and methods: Study done on 100 patients group of 50 patients of pregnancy induced hypertension and 50 normotensive controls were selected from antenatal clinics and antenatal wards. The fundoscopic changes in the last week of delivery were used for correlation of fetal outcome in Pregnancy induced hypertension.

Results: Pre-eclampsia was associated with high incidence of preterm delivery (60%), small for date infants (45%), low Apgar scores (73%), operative interference (37%), perinatal loss (33%) and poor fetal outcome (77%). Among 50 cases of 6 cases of pre-eclampsia had abnormal fundoscopic changes. Among the 6 cases, Grade I and Grade III had one patient none had Grade II changes, four had Grade IV changes. No correlation found between pre-eclampsia and fundoscopy.

Conclusion: A satisfactory relation between decreased visual acuity and increase in hypertensive grade could not be elicited as none of the study group had visual acuity changes.

Keywords: Pregnancy induced hypertension (PIH); Fundoscopy; blood pressure (BP).

Introduction

The aim of antenatal care is to ensure that every pregnancy results in a healthy mother and a well grown and healthy baby. Improvements over many years have led to excellent maternal outcome from pregnancy, and a dramatic reduction in perinatal mortality. Attention has now turned to perinatal morbidity with special emphasis on "fetus as a patient". As with any patient, conditions may arise that need to be identified and then appropriately assessed so that no iatrogenic harm occurs. The major difficulty is to identify the fetus at risk. Once identified, however, there is evidence that the perinatal outcome may be better than in an apparently low-risk pregnancy. There are many antenatal tests that would identify the fetus at risk of intrauterine hypoxia and death. Ideally such a test should not only be reliable, but performed easily and repeatedly.

Ocular involvement is common in PIH occurring in as many as 30–100% of patients.¹ Common symptoms are blurring of vision, photopsia, scotomas and diplopia. Visual symptoms may be the precursor of seizures. Progression of retinal changes correlates with progression of PIH and also with the fetal mortality due to similar vascular ischemic changes in the placenta.² There are very few data available in the published literature on the prevalence of retinal changes in PIH in a rural setup of North India.¹ Therefore, study was undertaken to evaluate the role of funduscopy changes for predicting adverse perinatal outcome in Pregnancy induced hypertension.

Materials and Methods

Study done in 50 pre-eclampsia cases from antenatal ward at department of obstetrics and gynecology. Patient those who know dates of LMP and with regular cycles were included in study.

Selection Criteria for Cases

Inclusion criteria: Age greater than 16 years and less than 30 years, gestational age greater than 24 weeks, patients with pregnancy induced hypertension,

Exclusion criteria: Multiple gestation, no cardiac/renal disease, congenital anomalies, chronic hypertension

Classification into two groups done as

Study group: 50 patients of pregnancy induced hypertension (PIH).

Control group: 50 normotensive women of age greater than 16 years and less than 30 years, gestational age greater than 24 weeks.

Pregnancy induced hypertension (PIH) was defined as a diastolic blood pressure (DBP) of 90 mm Hg or more and/or systolic blood pressure (SBP) of 140 mm Hg or more or rise of 15 mm Hg

in DBP or 30 mm Hg in SBP, obtained at least on two occasions 6 or more hours apart. Preeclampsia is development of hypertension with proteinuria or edema or both (Cunningham et al. 1990).

Severe PIH was said to occur if blood pressure was $\geq 160/110$ mm Hg with or without proteinuria and mild with blood pressure $\geq 140/190$ and $<160/110$ mm Hg, without proteinuria.

Each patient in study and control group history taking, physical examination, routine investigations, visual acuity and fundus oculi examination were done. The fundoscopic changes in the last week of delivery were used for correlation of fetal outcome.

*Hypertensive retinopathy was graded according to Keith–Wagener classification into:*³

- Grade I: Mild generalized arterial attenuation.
- Grade II: More severe Grade 1 and focal arteriolar attenuation.
- Grade III: Grade II + hemorrhages, hard exudates, cotton wool spots.
- Grade IV: Grade III + optic disc swelling (papilledema).

It was recorded by the following parameters of fetus noted as Gestation age (infant was preterm if <37 wks), Birth weight (Small for date infant was <2.5 kg at term), Fetal distress (Fetal heart drop to <120 /bpm, presence of meconium stained liquor or both), Apgar score at 5 minutes after birth (<7), Stay in the nursery, Perinatal loss (Stillbirth/Neonatal death) and Operative intervention for PIH or fetal distress.

Results

Patients of pre-eclampsia >24 weeks gestation were selected from antenatal clinics and antenatal wards of Mamata General Hospital, Khammam. They were classified into two groups

Table 1: Demographic details of patients

Variables	Study group (n = 50)	Control group (n = 50)	p-value
Gestational age			
< 37 weeks	30 (60%)	3 (6%)	p < 0.05
>37 weeks	20 (40%)	47 (94%)	
Birth weight			
Small for date	23 (46%)	5 (10%)	p < 0.01
Growth retardation	27 (54%)	45 (90%)	
Apgar score			

Variables	Study group (n = 50)	Control group (n = 50)	p-value
<7	37 (74%)	1 (2%)	p < 0.04
>7	13 (26%)	49 (98%)	
Operative interference			
Present	19 (38%)	0	p < 0.001
Absent	31 (62%)	50 (100%)	
Perinatal loss			
Present	17 (34%)	1 (2%)	p < 0.001
Absent	33 (66%)(40%)	49 (98%)	
Fetal outcome			
Poor	39 (78%)	1 (2%)	p < 0.001
Good	11 (22%)	49 (98%)	

Pre-eclampsia patients are in significant relation with early gestational age of delivery, decreased birth

weight, Apgar score of <7, operative interferences, perinatal loss and fetal outcome (Table 1).

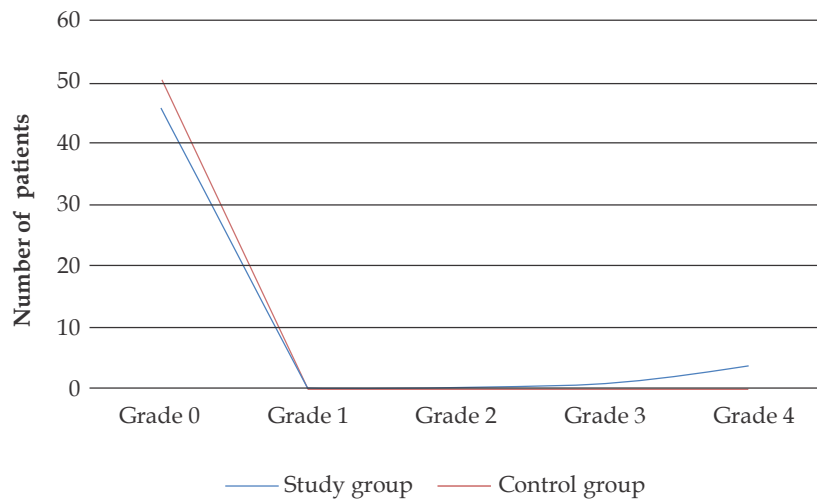


Fig. 1: Pre-eclampsia and fundus change.

Six cases of pre-eclampsia had abnormal fundoscopic changes. All had normal visual acuity. Among the 6 cases, Grade I and Grade III had one

patient each had Grade II changes, four had Grade IV changes. No correlation found between pre-eclampsia and fundoscopy (Fig. 1).

Table 2: Fundal changes in gestational age of patient

Patients	No.	Gestational age			
		< 37 weeks		>37 weeks	
		No.	%	No.	%
Study group	50	-	-	-	-
0	45	27	64	18	36
I	1	1	100	0	0
III	1	1	100	0	0
IV	3	3	100	0	0
Control group	50	-	-	-	-
Grade 0	50	3	6	47	94

Preterm delivery was seen in 60% of cases with normal fundus in study group and in all cases of abnormal fundus. In the control group preterm

delivery was seen in 6% with normal fundus. Preterm delivery was not significantly more in patients with abnormal fundus ($p < 0.6$) (Table 2).

Table 3: Fundus change with birth weight

Patients	No.	Birth weight			
		SFD		AGA	
		No.	%	No.	%
Study group	50	-	-	-	-
Grade 0	45	19	42	26	58
Grade I	1	0	0	1	100
Grade III	1	1	100	0	0
Grade IV	3	2	67	1	33
Control group	50	-	-	-	-
Grade 0	50	5	10	45	90

In the study group small for date infants were seen in 42% with Grade 0, none in Grade I, 100% in Grade III and 66% with Grade IV fundoscopic changes. In the control group small for date were seen in

10% with normal fundus. Growth retardation was not significantly higher in abnormal fundoscopic changes ($p < 0.6$) (Table 3).

Table 4: Fundus change – Apgar score

Patients	No.	Apgar score			
		<7		>7	
		No.	%	No.	%
Study group	50	-	-	-	-
Grade 0	45	32	71	13	29
Grade I	1	1	100	0	0
Grade III	1	1	100	0	0
Grade IV	3	2	67	1	33
Control group	50	-	-	-	-
Grade 0	50	1	2	49	98

In the study group, low Apgar was seen in 71% of cases with normal fundus, both cases in Grade I & III, 66% of Grade IV. In the control group low

Apgar score was seen in 2% with normal fundus. There was no significant correlation with low Apgar scores ($p < 0.6$) (Table 4).

Table 5: Fundus change with nursery stay

Grade of fundus	No.	Nursery stay			
		Present		Absent	
		No.	%	No.	%
Study group	50	-	-	-	-
Grade 0	45	18	40	27	60
Grade I	1	1	100	0	0
Grade III	1	1	100	0	0
Grade IV	3	3	67	1	33
Control group	50	-	-	-	-
Grade 0	50	1	2	49	98

In the study group nursery stay was seen in 40% of normal fundus, in all cases of Grade I, III and 66% of Grade IV. In the control group nursery stay

was seen in 2% with normal fundus. Significant correlation was not seen with abnormal fundus and nursery stay ($p < 0.1$) (Table 5).

Table 6: Fundus change with operative interference

Patients	No.	Operative interference			
		Present		Absent	
		No.	%	No.	%
Study group	51	-	-	-	-
Grade 0	45	16	36	29	64
Grade I	1	1	100	0	0
Grade III	1	1	100	0	0
Grade IV	3	1	33	3	67
Control group	50	-	-	-	-
Grade 0	50	0	0	50	100

In the study group operative interference was seen in 36% with normal fundus, patients with Grade I, Grade III and 33% of Grade IV fundus changes.

Operative intervention was not significantly more with changes in fundus (Table 6).

Table 7: Fundus change with perinatal loss

Grade of fundus	No.	Perinatal loss			
		Present		Absent	
		No.	%	No.	%
Study group	50	-	-	-	-
Grade 0	45	15	33	30	67
Grade I	1	1	100	0	0
Grade III	1	0	0	1	100
Grade IV	3	1	33	3	67
Control group	50	-	-	-	-
Grade 0	50	1	2	49	98

In the study group, perinatal loss was noted in 33% of Grade 0, 100% of Grade I, 33% of Grade IV. In the control group, perinatal loss was seen

in 2% with normal fundus. Perinatal loss was not significantly higher with fundus changes ($p < 0.6$) (Table 7).

Table 8: Fundus change with fetal outcome

Grade of fundus	No.	Fetal outcome			
		Poor		Good	
		No.	%	No.	%
Study group	50	-	-	-	-
Grade 0	45	33	73	12	27
Grade I	1	1	100	0	0
Grade III	1	1	100	0	0
Grade IV	3	3	100	0	0
Control group	50	-	-	-	-
Grade 0	50	1	2	49	98

In the study group, overall poor fetal outcome seen in 73% of Grade 0 and all cases of abnormal fundus changes. Poor fetal outcome was not significantly higher in patients of pre-eclampsia with presence of hypertensive change in fundus ($p < 0.6$). Our study had small sample size. We recommend similar study with large sample size so that we can get a more firm conclusion (Table 8).

Discussion

Compromised placental perfusion is almost certainly a major culprit in the genesis of increased perinatal morbidity and mortality (Cunningham et al.⁴). All the babies with Apgar score $< 5/10$, at 5 minutes of birth were admitted to nursery. A high perinatal loss in the present study can be attributed

to the fact that ours is a tertiary level institution and referral center and thus caters to a high-risk population. Another important contributory factor to the increased perinatal loss can be the fact that most of the patients were admitted either in late pregnancy or with advanced disease as emergency cases with severe PIH or eclampsia, and most of them in labor, where there was not much scope for optimum treatment.

The incidence of cesarean section was high largely due to the increased incidence of fetal distress both antepartum and intrapartum. Besides fetal distress other common reasons for cesarean delivery were failed induction and non-progress of labor. Diejomoo et al.⁵ reported three times higher cesarean delivery in mothers with pre-eclampsia.⁵ Similar finding has been reported herein among Martikainen et al.⁶ In this study comparison was made regarding fetal outcome in patients of PIH and normotensive controls. The outcome was significantly worse in the study (77%) ($p < 0.01$), than the controls (2%). The individual contributing factors, i.e. preterm delivery, small for date (S.F.D) infant, fetal distress, low Apgar score, operative interference for fetal distress or PIH and perinatal loss were all significantly more in the hypertensive group. Lin et al. found increased incidence of preterm birth, small for gestation age infants and perinatal death in pregnancy complicated by hypertension.⁷

Examination of retinal vessels in fundus of the eye, as an estimate of vasculopathy occurring in the entire body, has been used in hypertensive disorders. This was extended to hypertension occurring in pregnancy. The earliest fundus manifestations include reversible focal arteriolar spasm (Albert and

Dryja).⁸ Arteriolar narrowing and focal arteriolar constrictions have been loosely correlated with the diastolic blood pressure. Sometimes there are associated intraretinal hemorrhages, exudates, and nerve fiber layer infarcts.⁹ Disc edema evolves with the onset of malignant hypertension. In the present study normal fundus was found in all patients of the control group. In PIH 89% had normal fundus, 11% had hypertensive changes. This was not significant ($p < 0.1$). In our study all patients had normal visual acuity. None of the study group had Grade II fundus changes. Papilledema persisted 1 week after delivery in cases with Grade IV.

Grade IV change was indicative of severe PIH but seen too rarely to be a good screening test. Further, by the time it developed situation was already identified as 'severe' by clinical parameter. Fetal outcome was not significantly worse with any of the hypertensive changes. Patients with Grade IV has increased possibility of fetal compromise but its absence does not ensure a good outcome. In the present study no correlation was found with pre-eclampsia and fundus changes due to few numbers of cases. Jaffoe and Schatz⁹ after analyzing the results in a controlled trial of mild and severe PIH patients did not find any Grade III or IV changes.⁹ The number of focal spasms were significantly more in severe PIH than mild PIH but not higher in mild PIH than normotensive controls. Poor fetal outcome was not significantly more with increased number of focal vascular spasm. The progress to severe PIH may be indicated by alteration in the arteriovenous ratio, however by this time the diagnosis was clinically obvious. They suggested that visual acuity be used as a screening test for ophthalmological referral.

Table 9: Correlation of study with pre-eclampsia

Study	Percentage
Correlation with pre-eclampsia and preterm labor	
Sibai BM ¹⁰	12%
Present study	60%
Correlation with pre-eclampsia and small for date infants	
Long et al. ¹¹	18.2%
Present study	45%
Correlation with pre-eclampsia and perinatal loss	
Sibai BM ¹⁰	6.3%
Fairlie et al. ¹²	14%
Present study	33%
Correlation with pre-eclampsia and operative interference	
Sibai BM ¹⁰	21%
Present study	37%

A relationship between abnormality of uterine artery P.I and hypertensive grades of fundus change could not be established. 11% patients of PIH had fundus changes. Our study had small sample size. We recommend similar study with large sample size so that we can get a more firm conclusion (Table 9).

Conclusion

Poor fetal outcome was not significantly more with fundoscopic changes. Patients with abnormal fundus changes were few so regarding its correlation with adverse fetal outcome could not be deduced. However, the mere absence of fundus changes should not be taken as a conclusive evidence of maternal or fetal well being, though presence of marked hypertensive changes was more likely to be associated with a significantly worse maternal and fetal state. A satisfactory relation between decreased visual acuity and increase in hypertensive grade could not be elicited as none of the study group had visual acuity changes.

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