

Fundus Changes and Fetal Outcomes in Pregnancy Induced Hypertension: An Observational Study

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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.

Materials and Methods: Patients admitted with the clinical diagnosis of PIH were included in the study. Complete general, obstetrical and ocular history followed by ocular examination including direct ophthalmoscopy was done and noted. After delivery fetal outcome was assessed by gestational age, birth weight, 1 min Apgar score, still birth. The Chi-square test was used to evaluate the association between the various fundus changes and fetal outcomes.

Result: A total of 75 patients were examined. 60% patients were primigravida. Fundus changes were observed in 40% of patients. The means of systolic and diastolic BP of the patients with hypertensive fundus changes were 179.07 mm of Hg with a standard deviation (SD) 12.10 and 100.50 mm of Hg with SD of 12.86 respectively. Retinal changes were found to be associated ($P < 0.05$) with low birth weight (LBW) (2.5 kg).

Conclusion: Retinal changes are associated with LBW. Fundus evaluation in patients with PIH is an important procedure to predict adverse fetal outcomes.

Keywords: Apgar score, Hypertension, Hypertensive retinopathy, Low birth weight, Pregnancy-induced

INTRODUCTION

Pregnancy induced hypertension (PIH) is a hypertensive disorder in pregnancy that occurs after 20 weeks of pregnancy in the absence of other causes of elevated blood pressure (BP) ($\geq 140/90$ mm of Hg measured 2 times with at least of 6 h interval). When PIH is associated with significant proteinuria (protein in urine ≥ 0.3 g/in 24 h) it is termed as preeclampsia. When preeclampsia is associated with seizures, it is defined as eclampsia.¹ The pathological changes of this disease appear to be related to vascular endothelial dysfunction and its consequences (generalized vasospasm and capillary leak). Ocular involvement is common in PIH occurring in as many as 30-100% of patients.² Common symptoms are blurring of vision, photopsia, scotomas and diplopia. Visual symptoms may be the precursor of seizures.³ Progression of retinal changes

correlates with progression of PIH⁴ and also with the fetal mortality due to similar vascular ischemic changes in the placenta. 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. Therefore, this study was done to determine the prevalence of retinal changes in PIH and association between the retinal changes and BP on fetal outcome.

MATERIALS AND METHODS

This hospital based prospective, observational study was conducted jointly in the Department of Ophthalmology and Obstetrics and Gynecology in UP Rural Institute of Medical Sciences & Research, Saifai in between January, 2014 and August, 2014. Our institute is 700 bedded well

equipped UP State Government Tertiary Health Care Center in a rural setup of North India. All patients admitted to the obstetrics ward with the diagnosis of PIH and willing to participate were included in this study. Patients who had pre-existing diabetes, hypertension, renal disease or hazy ocular media were excluded from the study. This project was approved by the institutional ethical committee.

After obtaining an informed consent, the base line data for all patients were recorded. All the patients were initially evaluated by an obstetrician. Detailed history, general physical and systemic examinations were done. After taking history for any eye symptoms bedside anterior segment, examination was done with simple torch light. Direct ophthalmoscopic fundus evaluation was done under plain 1% tropicamide eye drop. Hypertensive retinopathy changes seen in right or left or both eyes were taken as positive findings in that patient. Age, para, gravida, BP were noted from the case record.

Hypertensive retinopathy was graded according to Keith-Wagener classification⁵ into:

- 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).

The mode of delivery either caesarean or vaginal and if vaginal whether spontaneous or induced were noted. Fetal outcomes were evaluated in term of gestational age, birth weight, 1 min Apgar score, still birth and neonatal death.

Statistics

Statistical analysis was performed using a statistical software package IBM SPSS Statistics (Statistical Package for the Social Sciences) analysis consisted of the mean with a standard deviation (SD). Various retinal changes and fetal parameters were analyzed by Chi-square test.

RESULTS

A total of 75 patients were examined, 46 patients (60%) were primigravida. 52 patients (69.4%) had PIH, 8 patients (10.6%) had preeclampsia and 15 patients (20%) had eclampsia. 39 patients (52%) had no any symptoms. The most common symptom in mother was headache (36%) followed by blurring of vision (8%) and sudden decreased vision (4%). Out of 75 patients hypertensive retinopathy was observed in 30 patients (40%). The mean of systolic and diastolic BP of patients with hypertensive retinopathy were 179.07 mm of Hg with SD 12.10 and

100.50 mm of Hg with SD 12.86 respectively, whereas these values without fundus changes were 145.17 mm of Hg with SD 4.94 and 92.13 mm of Hg with SD of 2.40 (Tables 1 and 2).

Out of 30 patients having fundus changes 70% had Grade 1 hypertensive retinopathy, while 20% had Grade II, and 10% had Grade III hypertensive retinopathy (Table 3).

The decision of induction of lower segment caesarean section was taken for various obstetrics indications and uncontrolled hypertension and worsened PIH signs (Tables 4 and 5).

Out of 30 patients having fundus changes, 10% had preterm delivery, 46.6% had low birth weight (LBW) which is significant ($P < 0.05$) and 20% have 1 min Apgar score < 5 (Table 6).

Table 1: Mean values of different variables

Variables	Fundus changes present (n=30)		Fundus changes absent (n=45)	
	Mean	SD	Mean	SD
Age (in years)	22.73	2.01	24	1.71
Systolic BP (in mm of Hg)	179.07	12.10	145.17	4.94
Diastolic BP (in mm of Hg)	100.50	12.86	92.13	2.40

BP: Blood pressure, SD: Standard deviation

Table 2: Various symptoms observed in mothers (n=75)

Symptoms	Number	Percentage
Headache	27	36
Sudden decreased vision	3	4
Blurred vision	6	8
No symptoms	39	52

Table 3: Hypertensive retinopathy in PIH and mean BP (n=30)

Grading of retinopathy	Number of patients with changes	Percentage	Mean systolic BP (in mmHg)	Mean diastolic BP (in mmHg)
Grade I	21	70	171.51	93.67
Grade II	6	20	180.66	97
Grade III	3	10	190	100
Grade IV	0	-	-	-

PIH: Pregnancy induced hypertension, BP: Blood pressure

Table 4: Mode of termination of pregnancy with fundus changes

Mode	Number	Percentage
LSCS	26	86.7
Vaginal induced	3	10
Vaginal spontaneous	1	3.3
Total	30	100

LSCS: Lower segment caesarean section

Patients having Grade II and III hypertensive retinopathy had 66.6% baby with LBW, which is significant ($P < 0.05$) (Table 7).

DISCUSSION

In the present study hypertensive retinopathy changes were seen in 40% of patients with PIH. Grade IV hypertensive retinopathy was not seen in any of the patients in this study. Jaffe and Schatz⁶ from USA have reported significant correlation between the reduction in arteriole to vein ratio, number of focal arteriolar constrictions and severity of preeclampsia. They did not find any hemorrhages, exudates, cotton wool spots or retinal detachment in their study of 17 mild preeclampsia and 14 severe preeclampsia patients. In a study of 275 cases of preeclampsia and 125 cases of eclampsia, Reddy⁷ from India has reported retinal changes in 53.4% preeclampsia and 71.2% in eclampsia patients (overall 59%, 236 out of 400). The most common retinal changes noted were narrowing of arterioles (45%, 183 out of 400 cases). He found that retinal changes were significantly more in patients with severe hypertension. Tadin *et al.*⁸ from Croatia have reported 45% of retinal changes in their

study of 40 patients with PIH. Karki *et al.*⁹ from Nepal have reported 13.7% of fundus changes in their study of 153 subjects with PIH. They assessed the fetal outcome in these patients and concluded that retinal and optic nerve head changes were associated with LBW. The prevalence of hypertensive retinopathy changes (40%) seen in our study is higher than 13.7% and lower than 59% but similar to 45% reported in the literature. We did not find any case of serious retinal detachment in the present study that is similar to the previously reported studies.⁷⁻⁹

Out of the visual symptoms blurred vision is most common followed by photopsia, scotoma and diplopia.¹⁰ In our study, we did not come across any patient complaining of photopsia or scotoma, but 12% had blurred/sudden diminution of vision. Anterior segment examinations 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.^{11,12} Our study showed that presence of fundus changes in patients of PIH was significantly associated with LBW ($P < 0.05$), but was not associated with fetal outcome in terms of gestational period (<37 weeks), 1 min Apgar score (<5), still birth. Statistically significant relationship was found with fundus findings in the forms of Grade II and Grade III hypertensive retinopathy changes ($P < 0.05$).

In general, it is believed that the presence of hypertensive retinopathy changes may indicate similar changes in the placenta. Since the well-being of the fetus depends on the placental circulation, ophthalmoscopic examination of mother's fundus may give a clue to similar microcirculation changes in the placenta and indirectly to the fetal well-being.⁹

Our study had small sample size. We recommend similar study with large sample size so that we can get a more firm conclusion.

CONCLUSION

There is no difference in fetal outcomes in PIH patients with vascular changes alone and those with no fundus changes. Visual symptoms are few in patients with PIH and often absent, unless the macula is involved. But the

Table 5: Mode of termination of pregnancy in patients without fundus changes (n=45)

Mode	Number	Percentage
LSCS	40	88.9
Vaginal induced	3	6.7
Vaginal spontaneous	2	4.4
Total	45	100

LSCS: Lower segment caesarean section

Table 6: Various fetal outcomes in patients with or without fundus changes

Fetal outcome	With fundus changes (n=30)	Percentage	Without fundus changes (n=45)	Percentage	P value
Gestational age <37 weeks	3	10	4	9	>0.05
LBW <2.5 kg	14	46.6	6	13.3	<0.05
1 min. Apgar score <5	5	20	9	22.2	>0.05

LBW: Low birth weight

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

Fundus changes	Numbers	Gestational age <37 weeks	P value	LBW <2.5 kg	P value	1 min. Apgar score <5	P value
Grade I	21	1	>0.05	8	>0.05	3	>0.05
Grade II	6	1	>0.05	4	<0.05	1	>0.05
Grade III	3	1	>0.05	2	<0.05	1	>0.05

LBW: Low birth weight

fundus evaluation can be recommended for all patients with PIH, considering the presence of the changes to be an indirect marker of severity of PIH. Pregnant mother with PIH having fundus changes should be followed up for their babies because LBW is significantly common in these babies.

REFERENCES

1. Dutta DC. Hypertensive disorders in pregnancy. Text Book of Obstetrics. 7th ed. New Delhi, India: JP Medical Ltd.; 2013. p. 219.
2. Hallum AV. Eye changes in hypertensive toxemia of pregnancy. A study of 300 cases. J Am Med Assoc 1936;106:1649-51.
3. Watson DL, Sibai BM, Shaver DC, Dacus JV, Anderson GD. Late postpartum eclampsia: An update. South Med J 1983;76:1487-9.
4. Riss B, Riss P, Metka M. Prognostic value of changes in the fundus oculi in EPH gestosis. Z Geburtshilfe Perinatol 1983;187:276-9.
5. Kanski JJ. Clinical Ophthalmology – A Systematic Approach. 2nd ed. Oxford: Butterworth Heinmann; 1989. p. 329.
6. Jaffe G, Schatz H. Ocular manifestations of preeclampsia. Am J Ophthalmol 1987;103:309-15.
7. Reddy SC. Ocular fundus changes in toxemia of pregnancy. Antiseptic 1989;86:367-72.
8. Tadin I, Bojic L, Mimica M, Karelavic D, Dogas Z. Hypertensive retinopathy and pre-eclampsia. Coll Antropol 2001;25 Suppl:77-81.
9. Karki P, Malla P, Das H, Uprety DK. Association between pregnancy-induced hypertensive fundus changes and fetal outcomes. Nepal J Ophthalmol 2010;2:26-30.
10. Davis EA, Dana MR. Pregnancy and the eye. In: Azar DT, Gragouclas, editors. Albert & Jakobek Principles and Practice of Ophthalmology. 2nd ed. Philadelphia: W.B. Saunders Company; p. 4768-9.
11. Fry W. Extensive bilateral retinal detachment in eclampsia with complete reattachment: Report of two cases. Arch Ophthalmol 1929;1:609-14.
12. Mabie WC, Ober RR. Fluorescein angiography in toxemia of pregnancy. Br J Ophthalmol 1980;64:666-71.

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