

A retrospective study of association of fundal changes and foetal outcome in preeclampsia and eclampsia

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Abstract

Aim: To determine the prevalence of retinal changes in pregnancy induced hypertension (PIH) and any association between the retinal changes, blood pressure, proteinuria, severity of the disease. **Methods:** All the patients admitted with diagnosis of PIH were included in this study. Age, gravida, gestation period, blood pressure, and proteinuria were noted from the case records. After taking history for any eye symptoms, fundus examination was done after dilating the pupils with direct ophthalmoscope in the ward itself. All the findings were noted on a data sheet, and were analyzed using SPSS programme. **Results:** A total of 100 patients of PIH were examined. The mean age of patients was 24 years (range 18-38 years). 97% had preeclampsia and 3% had eclampsia. Retinal changes (hypertensive retinopathy) were noted in 17% patients --- grade I in 11 (64%) and grade II in 6 (35%). Haemorrhages or exudates or retinal detachment were not seen in any patient. There was statistically significant association of retinal changes, blood pressure ($=0.001$), serum uric acid ($=0.003$), birth weight ($=0.001$), Apgar Score at 1 minute of birth ($=0.004$). **Conclusion:** Retinal changes (grade I and II hypertensive retinopathy) were seen in 17% of patients with PIH and they were significantly associated with blood pressure, serum uric acid levels. Fetal outcome is poor in those with fundal changes. Fundus examination helps in assessing the severity of PIH and helps in timely management.

Keywords: Pregnancy induced hypertension; retinal changes; preeclampsia; eclampsia;

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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. 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. Common symptoms are blurring of vision, photopsia, scotomas and diplopia. Visual symptoms may be the precursor of seizures¹. The retina is a unique site where the vasculature in the human body is visualized directly with the help of ophthalmoscope. The eye serves as a window through which the vessels of the body can be studied. Thus, a change in the retinal arterioles may indicate a similar state of the placenta; hence, it gives a reasonable idea of the state of placental circulation and fetal wellbeing. Fetal and maternal complication can be avoided if PIH is detected early. The pathological changes of this disease appear to be related to vascular

endothelial dysfunction and its consequences (generalized vasospasm and capillary leak). Vasospastic manifestations are reversible, and the retinal vessels rapidly return to normal after delivery².

MATERIALS AND METHODS

This is a retrospective study where in 100 patients admitted in Department of Obstetrics and Gynecology, Mandya Institute of Medical Sciences, with Preeclampsia and Eclampsia, from September 2014 to February 2015 were studied. Patients with pre-existing diabetes, hypertension, vascular/renal disease, any underlying ocular comorbidity like glaucoma or cataract, cases with placental abnormalities, congenital anomalies in fetus were excluded from the study. After taking history for any eye symptoms, anterior segment was examined with torch light on the bed itself. Both pupils were dilated with 1% Tropicamide eye drops, and ophthalmologist did fundus examination with a direct ophthalmoscope in the ward. Hypertensive retinopathy changes seen on right or left or both eyes are taken as positive findings in these patients. Age, parity, gravida, blood pressure recordings, proteinuria were noted from the case records. The PIH was graded as gestational hypertension, preeclampsia and eclampsia. All the findings were noted on a data sheet. Consent was taken for fundus examination. The retinal changes (hypertensive retinopathy) were graded according to Keith Wagener classification into:

Grade 1: Mild generalized arterial attenuation, particularly of small branches;

Grade 2: More severe Grade 1 + focal arteriolar attenuation;

Grade 3: Grade 2 + hemorrhages, hard exudates, cotton wool spots;

Grade 4: Grade 3 = optic disc swelling (papilledema).³

Proteinuria was tested using dipstick method and was graded as + = 30 mg/dL, ++ = 100 mg/dL, +++ = 300 mg/dL and ++++ ≥2000 mg/dL .

The mode of delivery either vaginal or Caesarean and if vaginal whether spontaneous or induced was noted. Fetal outcomes were evaluated in terms of gestational age,

birthweight, 1 minute Apgar score recordings, stillbirth and neonatal death.

The results were analyzed using SPSS program. Chi-square test was used to determine the association between the retinal changes and blood pressure, proteinuria, and severity of PIH. P value of < 0.05 was taken as significant. Institute Ethical Committee approval was taken.

RESULTS

Table 1: Mean standard deviation

	Mean	Standard Deviation(SD)	Range
Age(years)	24	4.36	(18 - 38)
SBP(mmHg)	139.5	10.088	(120 -170)
DBP(mmHg)	93.70	8.837	(80 -120)
Serum Uric Acid mg/dL	5.560	1.603	(2.0- 9.0)
Serum Urea mg/dL	22.85	4.511	(12 -40)
Serum Creatinine mg/dL	0.753	0.174	(0.1 -1.2)
Birth Weight(kg)	2.723	0.683	(1.1 - 4.6)

Total of 100 patients examined, 49% were Primigravida, 97% patients had preeclampsia, 3% had eclampsia, 17% had fundal changes. Mean systolic blood pressure(SBP) in patients with fundal changes was 147mmhg with SD 12 and Diastolic blood pressure (DBP) was 103mmhg with SD 11, whereas without fundal changes SBP was 137mmhg with SD 8 and DBP was 91mmhg with SD 6 with p value of 0.001, which is statistically significant. Out of 17 % with fundal changes 64% of them had Grade I changes and 35% of them had Grade II changes. All patients had proteinuria of varying severity ranging from 1+ to 3+ .It was significantly associated with retinopathy with p value <0.05. In present study serum creatinine ranged from 0.1 to 1.2mg/dl ,mean serum creatinine value was 1.067± 0.12 in patients with fundal changes with p value of 0.001 which was statistically significant. Serum Uric acid was increased in patients with fundal changes with mean value of 6.59±1.33, p value of 0.003 which was statistically significant. Two antihypertensive drugs were used in patients with fundal changes. However, age and gravida were not associated with occurrence of retinopathy in our study.

Table 2: Showing the association of retinopathy with different variables in patients with pregnancy induced hypertension

	Fundal Changes		t-test value	P-Value
	Present (n=17) (Mean ± SD)	Absent (n=83) (Mean ± SD)		
Age(years)	24.53 ± 4.84	24.45 ± 4.29	-0.072	0.943
SBP(mmHg)	147.65 ± 12.52	137.83 ± 8.70	-3.910	<0.001
DBP(mmHg)	103.53 ± 11.15	91.69 ± 6.78	-5.806	<0.001
Serum Uric Acid	6.59 ± 1.33	5.35 ± 1.58	-3.018	0.003
Serum Urea	24.82 ± 4.01	22.45 ± 4.52	-2.010	0.047
Serum Creatinine	0.782 ± 0.256	0.75 ± 0.154	-0.760	0.449
Birth Weight(kg)	2.19 ± 0.68	2.83 ± 0.63	3.738	< 0.001
APGAR SCORE 1 MIN	7.29 ± 2.34	8.54 ± 1.39	2.958	0.004

Table 3: Showing the association of retinopathy with different variables in patients with pregnancy induced hypertension

	Fundal changes			Chi Square	P_value
	Normal	Grade 1	Grade 2		
AGE					
≤ 20	19	03	01	1.087	0.897
21 – 30	60	07	05		
31 -40	04	01	0		
PARITY					
Primigravida	38	08	03	2.82	0.244
Second gravida and Others	45	03	03		
PROTEINURIA					
+	72	05	01	25.56	<0.001
++	10	06	05		
+++	01	0	0		
ANTI HYPERTENSIVE DRUGS USED					
1	71	04	01	25.19	<0.001
2	12	07	05		
MODE OF DELIVERY					
Spontaneous vaginal delivery	23	04	0	3.78	0.437
Normal (Induced) vaginal delivery	15	03	02		
Caesarean	45	04	04		
PERIOD OF GESTATION					
Term	67	05	03	11.207	0.024
Pre Term	11	05	03		
Post dated	05	01	0		

The decision of induction of labour or caesarean section was taken for various obstetrics indications, uncontrolled hypertension and worsened PIH signs. 53% had caesarean section and for 20% had vaginal delivery following induction and remaining (27%) had spontaneous vaginal delivery. 19% of patients had preterm delivery, among which 8 patients had fundal changes. Mean birth weight in patients with fundal changes was 2.19 kg which is statically significant with p value of 0.001 and APGAR score at 1 minute in babies born to mother with fundal changes was 7 with p value of 0.004.

DISCUSSION

Among the 100 patients who were suffering from Pregnancy Induced Hypertension (PIH) only 17% pregnant mothers were suffering from different grade of hypertensive retinopathy according to fundus changes and 83% were also suffering from hypertension with no ocular fundus change. Karki *et al.* from Nepal have reported 13.7% of fundus changes in their study of 153 subjects with PIH⁴. Grade III and IV hypertensive retinopathy was not seen in any of the patients in this study. The prevalence of ocular changes in PIH patients

as described in literature varies from 30 to 100%^{5,6}. Prevalance of fundal changes in preeclampsia and eclampsia patients in present study is 17% with only GRADE I and GRADE II changes. Haemorrhages, exudates and retinal detachment were not seen in any of the patients in this study. The absence of haemorrhages and exudates observed in present study has been supported by Jaffe and Schatz⁸. In present study significant association between blood pressure and fundal changes was seen. This was also observed in studies by Tandin *et al.*⁷ and Mithila *et al.*⁹. In present study, there was an increase in the mean value of serum uric acid with increase in severity of preeclampsia. Our study is also supported by Mithila *et al.* study which reported that retinopathy was found to be significantly associated only with serum uric acid levels among all lab parameters. They observed positive association between retinal changes and serum uric acid⁹. It has been observed that the progression of retinal vascular changes is a sign of increasing severity of PIH and have correlated them with fetal mortality⁴. Our study showed that presence of fundus changes in patients of PIH was significantly associated with LBW ($P < 0.05$) with mean birth weight of 2.19 kg

and mean APGAR SCORE at 1 minute of 7 in patients with fundal changes but was not associated with fetal outcome in terms of gestational period (<37 weeks), still birth. Similar results were found in study of Ranjan et.al, Out of 30 patients having fundus changes, 10% had preterm delivery, 46.6% had low birth weight (LBW) which was significant ($P < 0.05$) and 20% have 1 min Apgar score < 5 ¹. Tadin *et al.*⁷ from Croatia have reported 45% of retinal changes in their study of 40 patients with PIH. Karki *et al.*⁴ 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 Low birth weight. There was significant association of retinopathy with proteinuria, serum uric acid levels and the foetal birth weight with p value < 0.05 ⁹. 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, Ophthalmoscope examination of mother's fundus may give a clue to similar microcirculation changes in the placenta and indirectly to the fetal well-being^{1,4}.

CONCLUSION

Fundoscopy of retina is a simple, non-invasive, safe and reliable procedure to interpret the vascular changes especially in preeclampsia. 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. Fundus evaluation can be recommended for all patients with pregnancy-induced hypertension, considering the presence of the changes to be an indirect marker of severity of Preeclampsia.

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