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# AN OBSERVATIONAL STUDY OF RETINAL CHANGES IN DIFFERENT CATEGORIES OF PREGNANCY INDUCED HYPERTENSION

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**ABSTRACT** **Background.** Hypertensive disorders of Pregnancy is a known complication of pregnancy that poses a risk for both mother and foetus. Characteristic ophthalmological manifestations are due to dysfunction of vascular endothelium and subsequent vasospasm and capillary leakage affecting choroid and retina which are sudden onset dimness of vision, diplopia, scotoma. Fundoscopic findings include hypertensive retinal changes of various stages.**Aims and objectives.** To find out hypertensive retinopathy association with severity of hypertensive disorders of pregnancy and to find out its association with gravida and age. **Study design.** This is a cross-sectional observational study of 6 months duration from October 2021 to March 2022 done in a tertiary hospital of Kolkata, West Bengal. Methods. 160 mothers with PIH were examined during the study. After taking thorough obstetric and ocular history ocular examination was performed using direct and indirect ophthalmoscope dilated pupil and the findings were noted. After the study period the collected data was analyzed by standard statistical tools. **Results.** Total 160 pre-diagnosed patients of PIH with mean age of 24 (ranging from 18-38 years) having gestation period of 28 week to 41 weeks were examined. Among them 96 patients (60%) had developed hypertensive retinopathy changes. The retinal changes were graded according to Keith-Wagner-Barker classification. 68 patients (42.5%) had generalized arterial attenuation ( Grade-I ), while 20 patients (12.5%) developed focal arteriolar attenuation ( Grade - II ). 6 patients (3.8%) developed Grade III hypertensive changes, 4 of them had only retinal hemorrhages, 2 of them developed both retinal hemorrhages and hard exudates. 2 patients (1.3%) developed Grade mild IV changes amongst whom 1 patient had associated exudative retinal detachment. **Conclusion:** Fundoscopic evaluation of PIH patients revealed that 60% patient had hypertensive retinal changes, including 55% belonging to grade I & II hypertensive changes and 5.1% patients showing to grade III & IV changes.

**KEYWORDS :** pregnancy induced hypertension, ophthalmoscopic changes, hypertensive retinal changes.

## INTRODUCTION

Hypertensive disorder of pregnancy is a common cause of both fetal and maternal mortality in India *[1,2].* Pregnancy induced hypertension is defined as high maternal blood pressure (BP>140/90 measured at least on two occasion with a minimum interval of 4 hours in seating position) after 20 weeks of pregnancy without any known cause of high blood pressure *[3]*. It can be classified as preeclampsia when along with high BP patient also presents with either proteinuria (>_ 0.3gm/300mg in a 24 hour urine sample or urinary protein/ creatinine >_ 0.3 or dipstick (+1)) or end organ damage. Preeclampsia is further classified into mild and severe preeclampsia (BP >_160/100 and/or end organ damage). When preeclampsia is associated with seizures it is termed as eclampsia *[4, 5]*. The pathophysiological changes appear to be due to vascular endothelial dysfunction with generalised vasospasm and capillary leakage *[6]*.

Ophthalmological manifestations are common in PIH ranging from blurring of vision, photopsia, diplopia to scotoma. Visual symptoms are known to be precursors of seizures *[7].* Various studies have found that vasoconstriction of the retinal arteriolar lumen are a common finding in PIH. This can be localized arteriolar constriction or this may also present as generalized phenomenon. These constrictions are found to be arteriolo-spastic in nature and these are mostly reversible. After delivery with normalization of blood pressure retinal vasculature is found to regain it's calibre in most cases *[8-12]*. Though fleeting angiospasm can sometime lead to amaurosis fugax *[13]* like episodes and early diagnosis and swift management of these episodes are key to prevent more serious retinopathy and generalized disease progression. The major vascular changes due to vasospastic and vasculosclerotic causes seen in ophthalmoscopy includes focal vascular narrowing, A-V crossing changes, vascular sheathing, generalized arteriolar attenuation, vascular reflex like copper wiring or silver wiring of arterioles *[8-12]*. Retinal oedema is also a finding in PIH which is commonly found to be progressing along the nerve fibre layer of retina starting from the upper and lower poles of optic disc towards the periphery along the course of retinal vessels *[14,15].* Flame shaped haemorrhages and dot-blot haemorrhages can also be seen. In severe pre-eclampsia and eclampsia with persistently high BP or with poor control, papilloedema is a common finding, the oedema may extend to surrounding retina too. The most drastic complication of PIH is retinal detachment, though spontaneous resolution is known to occur in most cases [16, 17].

Apart from diagnosis of eye related problems ocular examinations also help in assessing disease severity, progression and response to management. Ophthalmoscopy is an easy tool for assessing pathological fundus changes and effect of hypertension on retinal vasculature.

## METHODOLOGY

This is a cross-sectional observational study of 6 months duration from October 2021 to March 2022 done in a tertiary hospital of Kolkata, West Bengal. Patients admitted in the obstetrics ward with the diagnosis of PIH were studied during this study. Patients with history of hypertension, collagen vascular disease, cardiovascular disease were excluded from the study. Also patients with pre-existing media opacities were excluded from the study. Thorough obstetric history taking, examination and initial evaluation was done by the obstetrician. The PIH was graded as pre-eclampsia (mild and severe) and eclampsia. General ocular examination including visual acuity examination, anterior segment evaluation with torch at bedside was done. Pupils were pharmacologically dilated by 0.8% tropicamide+ 5% phenylephrine combination eye drops and direct and indirect ophthalmoscopy was done on bedside. All the findings were noted on a data sheet. Fundus changes were noted and (hypertensive retinopathy) were graded according to Keith Wagener Barker classification into following grades *[18]*.

Grade 1: Generalized arteriolar narrowing
Grade 2: Focal narrowing and arteriovenous nicking/nipping
Grade 3: Grade 2 plus exudates, haemorrhages, and cotton–wool spots
Grade 4: Grade 3 plus optic disc swelling

Obtained data was entered on MS EXCEL and was analysed using SPSS v20.

Chi-square test was used to determine the association between the retinal changes with severity of PIH , gravida and age. A P value <0.05 was taken as significant.

## RESULT

Total 160 patients of PIH with age ranging from 18-38 years were examined. Patients were belonging to gestation period of 28 weeks to 41 weeks. 96 patients (60.4%) had developed hypertensive ophthalmoscopic changes. The retinal changes were graded according to Keith-Wagener-Barker classification. 68 patients (42.5%) had mild generalized arterial attenuation ( Grade-I ), while 20 patients (12.5 %) developed focal arteriolar attenuation ( Grade - II ).6 patients (3.8 %) developed Grade III hypertensive changes, 4 of them had only retinal hemorrhages, 2 of them developed both retinal hemorrhages and hard exudates. 2 patients (1.3 %) developed Grade IV changes amongst whom 1 patient had associated exudative retinal detachment.

## DISCUSSION

160 pre-diagnosed patients 0f PIH patients were examined in this study of which 139 patients of pre-eclampsia and 21 patients of eclampsia were tested. In this study it is found that 60% patients developed hypertensive retinal changes and 40% patient had no fundus change. The prevalence of retinal changes in association with gestational hypertension ranges from 30%-100% according to various studies *[9]*. Findings of our study correlate with study done by Reddy SC et al 2012 *[19]*.

Tadin et al from Croatia (2001) have reported 45% of retinal changes in their study of 40 patients with PIH *[20].* Our study shows higher incidence of positive retinal findings than that. The cause of higher incidence may be due to lack of overall awareness regarding the importance of antenatal visit to hospital in India.

Our study shows statistically significant correlation between severity of PIH and fundoscopic changes ($p < 0.05$). Though age and gravida were not associated with the occurrence of fundoscopic changes according to our study ($p > 0.05$). Our findings were in correlation with the findings of Reddy SC et al from Malaysia, 2012 *[19]* in which hypertensive retinopathy changes were noted in 59%(46 out of 75 PIH patients) studied PIH patients of which 52.6%(41 patients ) developed Grade-I and 6.4%(5 patients) developed Grade-II hypertensive retinopathy changes. Haemorrhages, exudates and retinal detachment were not seen in any patients.

Neutra et al reported in their study that incidence of PIH and associated hypertensive retinopathic changes are more common in younger age group *[21]*. The rational for higher incidence of retinal changes in primigravida mothers and mothers of younger age group may be due to the higher sensitivity of young retinal arterioles to increased blood pressure.

Most common ophthalmoscopic finding that we encountered was generalised arteriolar narrowing as 42.5% of all the patients had signs of grade 1 hypertensive retinopathy changes. 12.5% patient had focal arteriolar narrowing and associated A-V crossing changes. Retinal haemorrhages were seen in 6 (3.8%) patients' fundus, and some of them also had associated hard exudates. 2 (1.5%) patients also developed associated papilledema.

In a similar study by Kicinski et al, 139 patients were examined and retinal arteriolar constriction was found in 87 (62.5%) patients and with organic retinal change including cotton wool exudates, hemorrhages and papilledema were found in 22 cases (15.8%) *[22,23].*

The incidence of overall fundus changes in PIH in our study was lower than what was found in the study done by Kicinski et al in 1964.

Presence of papilledema and retinal detachment calls for prompt termination of pregnancy to reduce the risk to both foetus and mother regardless of duration of gestation.

In our study of 160 patients we faced 1 case of unilateral exudative retinal detachment. Exudative retinal detachment is a rarity in PIH patients.

Choroidal dysfunction and ischemia of choreocapillaries are thought to be the causative mechanism of the detachment of neurosensory retina. Spontaneous reattachment of the retina generally occurs within weeks of delivery with marked visual improvement as subretinal fluid gets reabsorbed by RPE *[16, 17]*. Retinal pigment epithelial lesions, called Elscchnig spots, may also be found in preeclamptic patient with choroidal infarcts.

## CONCLUSION

In our study of 160 PIH patients fundoscopic evaluation revealed that 60% patient had hypertensive retinal changes, including 55% belonging to grade I & II hypertensive changes and 5.1 % patients showing to grade III & IV changes. Our study also shows statistically significant correlation between severity of PIH and hypertensive changes of retina.

In conclusion it can be said that in mothers with PIH ophthalmoscopic examination of the fundus holds a key role in assessing both foetal and maternal outcomes. As foetal circulation is dependent on placental circulation, fundoscopic examination may give indication to similar microvascular changes in placental circulation.

Unless macula is involved due to generalised retinal oedema or haemorrhage or exudative changes visual symptoms are mostly limited to mild blurring of vision. Usually presence of papilledema indicates increased intra cranial tension and may lead to seizures in mothers with PIH. So ophthalmoscopy can be a useful tool to prevent further deterioration in these patients.

The hypertensive retinal vascular changes usually regress with decrease in blood pressure and mostly reverse to the previous state after delivery within weeks due to lack of placental toxins.

So regular and repeated ophthalmoscopic evaluation of fundus oculi can help to clinically assess the severity and progression of PIH and also help in assessing the response to treatment. It is an important clinical examination to predict and prevent adverse foetal and maternal outcomes. Fundoscopic examination should be recommended for all patients with gestational hypertension as the retinal changes can be a indirect indicator of the severity of PIH.

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