

Retinal Manifestations in Pregnancy Induced Hypertension: A Cross-Sectional Study

Dr. Trushal Solanke¹, Dr. Shailendra Deshmukh², Dr. Aditi Kasat³, Dr. Radhika Darak⁴

¹M.B.B.S. M.S. Ophthalmology

Email: [tsolanke.ts\[at\]gmail.com](mailto:tsolanke.ts[at]gmail.com)

²M.B.B.S. M.S. Ophthalmology

³M.B.B.S. M.S. Ophthalmology

⁴M.B.B.S. DOMS DNB Ophthalmology (Corresponding Author)

Abstract: *This study investigates the prevalence of retinal changes in patients with pregnancy induced hypertension PIH and examines the correlation between blood pressure levels and retinal abnormalities. A hospital based cross sectional study was conducted on 189 patients diagnosed with PIH. The results indicate that 50.8 of the patients exhibited positive fundus changes, with a significant association between the severity of PIH and retinal manifestations. This study highlights the importance of regular fundus examinations in managing PIH to monitor disease progression and fetal outcomes.*

Keywords: Pregnancy Induced Hypertension, Hypertensive disorders in pregnancy, Blood pressure, retinal changes

1. Introduction

Toxemia of pregnancy has been recognized for over 2000 years, known for its complications and potential fatality.¹ The term hypertensive disorders in pregnancy, as defined by the American College of Obstetrics and Gynecology, is now widely accepted.²⁻³

PIH is a pregnancy specific syndrome that can virtually affect every organ system. It is defined as rise of blood pressure $\geq 140/90$ mmHg after 20 wks gestation with proteinuria ≥ 300 mg/24 hrs or $\geq +1$ on dipstick. Although the cause of PIH remains unknown, its manifestations begin early in pregnancy. Many pathophysiological changes occur that gain momentum across gestation and gradually become clinically apparent and ultimately result in multi – organ involvement with a clinical spectrum ranging from barely noticeable to one of cataclysmic deterioration.

Preeclampsia complicated by generalised tonic clonic convulsion is termed as Eclampsia. Hypertension is the most significant primary sign. Oedema occurs initially in the lower legs but may progress to massive oedema or anasarca. PIH is a multisystem disorder which include cardiovascular, haematological, hepatic, renal, neurological abnormalities and ocular manifestations. Severe toxemia is the primary cause of visual system involvement. The retinal vascular changes majority of times but not always correlate with systemic hypertension. Vessel constriction may develop over days and persist for weeks to months.

Ocular involvement is common in PIH.⁴ Common symptoms are blurring of vision, photopsia, scotomas and diplopia. Visual symptoms may be the precursor of seizures.⁵⁻⁶ Progression of retinal changes correlates with progression of PIH and also with the fetal mortality due to similar vascular ischemic changes in placenta.⁷ Vasospastic manifestations are reversible and the retinal vessels rapidly return to normal after delivery.

Retinal changes are likely to occur when systolic pressure rises above 160 mm Hg and diastolic pressure exceeds 100 mm Hg, with significant changes noted at 200/130 mm Hg.⁸⁻⁹ Choroid is also frequently affected in the disease; choroidal ischemia and infarction may occur. The ischemia of occipital lobe and optic nerve may occur and recovery usually occurs unless there is significant infarction. Sometimes visual disturbances may be the presenting symptom; fewer common symptoms include amaurosis, photopsia, scotomata, diplopia, achromatopsia and hemianopia. The abnormalities of the retina and the retinal vasculature are most frequent though the conjunctiva, choroid, optic nerve and the visual cortex may be affected. Visual loss as a result of vascular involvement is usual. Vision threatening conditions involve central retinal artery occlusion, secondary optic atrophy, macular tear, central serous retinopathy, retinal detachment, central retinal vein occlusion, choroidal ischemia and haemorrhage. Spontaneous vitreous haemorrhage may occur in cases of HELLP syndrome.

The precise mechanism of ocular changes due to preeclampsia is likely a combination of coexisting systemic vascular disease, change in hormones, endothelial damage, breakthrough in autoregulation, and hypoperfusion ischemia/hyperperfusion edema. Blindness has been reported in 15% of females with preeclampsia, and it may occur postpartum. It is thought that this is due to compromise in the retinal or occipital lobe vasculature. Fortunately, cortical blindness in preeclampsia is always transient, with reports of it lasting from 4 hours to 8 days.¹⁰

Retinal microvascular abnormalities, such as focal and generalised arteriolar narrowing, arteriovenous nicking, and retinopathy (for example, microaneurysms and retinal haemorrhages) are seen fairly frequently in the adult population. Although these retinal abnormalities are long known to be associated with hypertension status and elevated blood pressure (BP),¹¹ much remains to be understood regarding the nature of these associations.

Volume 13 Issue 8, August 2024

Fully Refereed | Open Access | Double Blind Peer Reviewed Journal

www.ijsr.net

Fundus examination in PIH is important in monitoring and managing cases as it correlates with severity as it indirectly implies severity of changes in placental micro-circulation and ocular morbidity.¹²

Progression of retinal changes correlates with progression of PIH, maternal outcome and also with the foetal mortality due to similar vascular ischemic changes in the placenta.

Ocular examination of PIH patients not only helps in diagnosis of eye problems but repeated observations assist in assessing the severity and progression of disease, response to treatment and ultimate outcome or prognosis.¹³ Ophthalmoscope can easily detect the pathological changes in the fundus and the retinal blood vessels in particular that reflect the effect of hypertension throughout the vascular system.¹⁴⁻¹⁵

Ophthalmoscope should be rated next to the sphygmomanometer as an instrument of diagnostic importance in cases of PIH. Ophthalmoscopy does not only help in diagnosing the disease but repeated observations assist in assessing the severity, progress of disease, response to treatment if any and ultimate outcome or prognosis.¹⁶

In a very recent study Gaikwad C et al¹⁷ observed prevalence of abnormal fundus findings was 10.1% in grade I hypertension while it was 100% in cases with grade II and III hypertension. A significant association was observed between severity of hypertension and abnormal fundus findings. Prevalence of abnormal fundus findings was 0% among cases with no proteinuria while it was 85.7% in cases with grade 1+ proteinuria. All the cases with grade 2+ or more proteinuria had abnormal fundus findings. A significant association was observed between severity of proteinuria and abnormal fundus findings.

Hence the present study was done at our tertiary care centre to determine the prevalence of retinal changes in pregnancy induced hypertension (PIH) and the correlation between blood pressure and retinal changes in PIH patients.

Classification: The retinal changes (hypertensive retinopathy) were graded according to Keith Wagener classification into:

- Grade I- mild generalized arterial attenuation, particularly of small branches;
- Grade II-more severe grade I+focal arteriolar attenuation;
- Grade III-grade II+ haemorrhages, hard exudates, cotton wool spots;
- Grade IV-grade III=optic disc swelling (papilloedema).

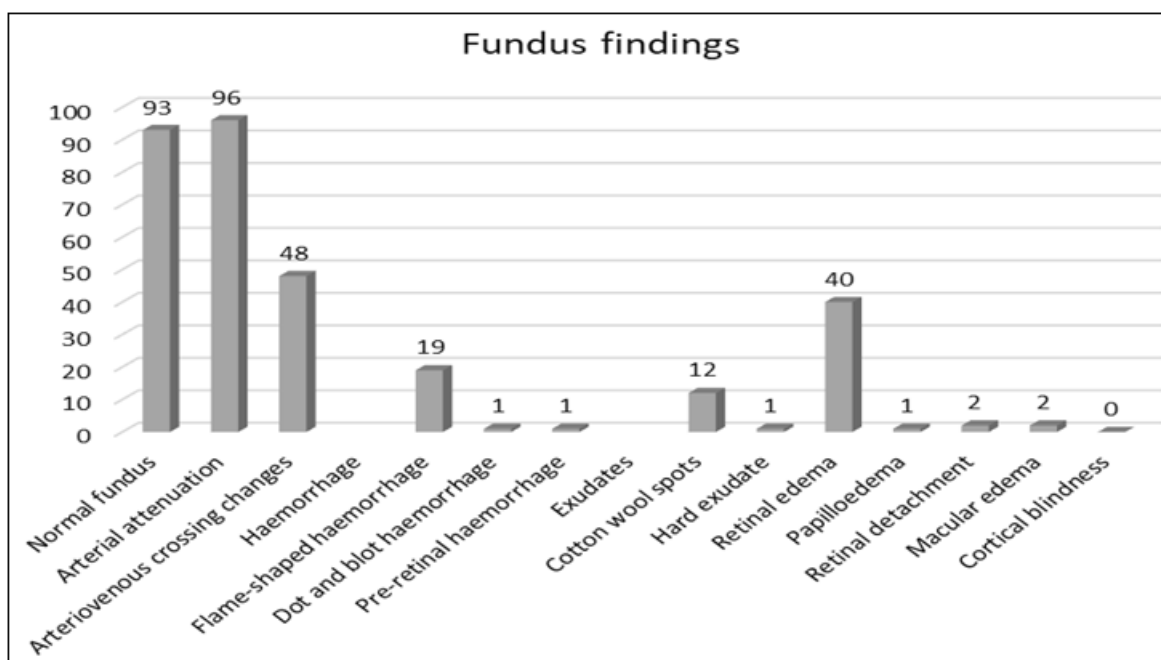
The severity of PIH was classified into preeclampsia (mild and severe) and eclampsia, based on the following findings:

- **Mild preeclampsia** --- BP >140/90mmHg, proteinuria+, and/or mild edema of legs;
- **Severe preeclampsia** --- BP >160/110mmHg, proteinuria ++ or +++, headache, cerebral or visual disturbances, epigastric pain, impaired liver function tests, and increased serum creatinine;
- **Eclampsia** ---severe preeclampsia + convulsions.

Fundus changes in Pregnancy Induced Hypertension

The clinical course of fundus changes in PIH may be divided into three stages:

- 1) **Spastic stage:** Characterised by spasm of retinal arterioles.^{10,14-15}
- 2) **The stage of sclerosis:** When pregnancy induced hypertensive changes are superimposed on pre-existing organic sclerotic changes in the vessels.
- 3) **The stage of retinopathy:** Characterised by cotton wool spots, micro aneurysms, flame shaped and splinter haemorrhages, hard exudates, disc edema etc.



Graph 1: Distribution of patients according to Fundus findings

2. Case Study

A hospital based cross sectional study was conducted with 189 patients to determine the prevalence of retinal changes in Pregnancy Induced Hypertension (PIH) and association between the retinal changes and blood pressure.

All pregnancy-induced hypertensive patients admitted in ward diagnosed as PIH (Blood pressure more than 140/90) after 20 weeks of gestation attending OPD/IPD of Tertiary care Hospital who fulfilled the inclusion criteria.

Inclusion Criteria

All admitted patients in ward diagnosed as PIH (Blood pressure more than 140/90)

Exclusion Criteria

Preexisting hypertension in pregnant females. i.e. History of hypertension before pregnancy.

3. Conclusions

Retinal changes are the indicator of hypertension severity. In PIH patients, grade-1 and grade-2 hypertensive retinopathy is the common. The presence of disc edema, macular edema, or retinal detachment was an indication that the procedure should be terminated. The retinal changes resolve shortly after the pregnancy. If the retinal changes persist, a history of chronic hypertension must be ruled out. Pregnant hypertensive mothers should be followed up on for their babies, who will be screened for Retinopathy of Prematurity, and early detection of toxemic retinopathy may help obstetricians to manage the mother and fetus.

Pregnancy induced hypertension presence of changes in the retinal arterioles and retinal haemorrhages may indicate similar changes in the placenta. Since the well-being of the foetus depends on the placental circulation, ophthalmoscopic examination of mother's fundus may give a clue to similar micro-circulation changes in the placenta and indirectly to the foetal wellbeing.

Proper antenatal care should be followed up with early detection of PIH cases, which prevents them from progressing to Grade 3 hypertensive retinopathy.

This study is significant as it underscores the correlation between retinal changes and the severity of pregnancy induced hypertension, which could be pivotal in improving maternal and fetal outcomes through early detection and management.

References

- [1] Dieckmann WJ. The toxemias of pregnancy. 2nd edition. St. Louis: CV Mosby. 1952:240-249.
- [2] Hughes EC, Editors. Obstetric-Gynaecology Terminology. Philadelphia: FA Davis. 1972: 422-423.
- [3] Davey DA, MacGillivray I. The classification and definition of the hypertensive disorders of pregnancy. *Am J Obstet Gynecol.* 1988;158:892-898.
- [4] Jaffe G, Schatz H. Ocular manifestations of pre-eclampsia. *Am J Ophthalmol* 1987;103:309-315.

- [5] Gibson GG. The clinical significance of retinal changes in hypertensive toxemia of pregnancy. *Am J Ophthalmol.* 1938; 21:22.
- [6] Prachakvej P. Retinal changes in toxemia of pregnancy. *J Med Assoc Thai.* 1971; 54: 552-558.
- [7] Sandowsky A, Serr DM, Landau J. Retinal changes and foetal prognosis in toxemia of pregnancy. *Obstet Gynecol.* 1956; 8: 426-431.
- [8] Reddy SC Naliah S, Rani S. Fundus changes in pregnancy induced hypertension. *International journal of ophthalmology.* 2012;5(6):694-697.
- [9] Duke-elder S, Debree JM. System of ophthalmology. Volume X. Disease of the retina. United States of America: CV Mosby Company. 1967:350.
- [10] Cunningham FG, Fernandez CO, Hernandez C. Blindness associated with preeclampsia and eclampsia. *Am J Obstet Gynecol.* 1995;172(4Pt 1):1291-1298.
- [11] Wagener HP, Clay GE, Gipner JF. Classification of retinal lesions in the presence of vascular hypertension. *Trans Am Ophthalmol Soc.* 1947; 45: 57-73.
- [12] Jayashree MP, Niveditha RK, NG Kuntoji et al. Ocular Fundus changes in pregnancy induced hypertension – A case series study. *J Clin Res Ophthalmol.* 2018;5(2):037-041
- [13] Wagner HP. Arterioles of the retina in toxemia of pregnancy. *JAMA* 1933;101:1380-1384.
- [14] Hallum AV. Eye changes in hypertensive toxemia of pregnancy. A study of three hundred cases. *JAMA.* 1936; 106: 1649-1651.
- [15] Sheie HG. Evaluation of ophthalmoscopic changes of hypertension and arteriolar sclerosis. *Arch Ophthalmol.* 1953; 49: 117-38.
- [16] Kicinski J. Some problems of pregnancy, labour and puerperium in women with pulmonary tuberculosis. *Prace. L'odzkie Towarzystwo Naukowe. Wydzial IV, Nauk Lekarskich.* 1964;54:1.
- [17] Gaikwad C, Khune A, Mahadik S et al. A Study of Ocular Fundus Findings in Hypertension during Pregnancy in a Tertiary Care Hospital. *MVP Journal of Medical Sciences.* 2022:163-170.