

# International Journal of Medical Ophthalmology



E-ISSN: 2663-8274  
P-ISSN: 2663-8266  
[www.opthalmoljournal.com](http://www.opthalmoljournal.com)  
IJMO 2021; 3(1): 141-143  
Received: 05-04-2021  
Accepted: 22-04-2021

**Dr. Alanka Lavanya**  
Associate Professor,  
Department of  
Ophthalmology, Madha  
Medical College, Kandrathur  
Main Road, Kovur, Chennai,  
Tamil Nadu, India

**Dr. Veduruparty Lakshmana Rao**  
Associate Professor,  
Department of Obstetrics and  
Gynecology, Madha Medical  
College, Kandrathur Main  
Road, Kovur, Chennai, Tamil  
Nadu, India

## Comparative analysis of ocular changes in normal pregnancy and pregnancy-induced hypertension

**Alanka Lavanya and Veduruparty Lakshmana Rao**

**DOI:** <https://www.doi.org/10.33545/26638266.2021.v3.i1b.247>

### Abstract

**Background and Objectives:** The ocular adaptations that occur during pregnancy are just one of the many physiological changes that might be impacted by pregnancy-induced hypertension (PIH). In addition to being early warning signs of maternal and foetal risk, abnormalities in the eyes, including changes in visual acuity, retinal vasculature, and intraocular pressure (IOP), can indicate systemic problems. The purpose of this research was to find the first signs of hypertensive disorders of pregnancy by comparing the eye changes that occur during normal pregnancy with those that occur with PIH.

**Material and Methods:** In this prospective observational study, 60 pregnant women were separated into two groups: Group I, which consisted of 30 women experiencing a normal pregnancy, and Group II, which consisted of 30 women experiencing pregnancy-induced hypertension. As part of a thorough eye exam, the patient had their visual acuity tested, their fundus looked at, and their intraocular pressure measured with applanation tonometry. We took the patient's blood pressure and other pertinent obstetric measurements.

**Results:** Both groups maintained very normal visual acuity; however, 4 patients (13.3%) in the PIH group showed a slight decrease. Eight patients (26.6% of the total) in the PIH group had fundus abnormalities, such as narrowing of the retinal arteriolar and changes in arteriovenous crossing, whereas no such changes were seen in the normal pregnancy group. When comparing normal pregnancy ( $13.8 \pm 2.1$  mmHg) to PIH ( $16.2 \pm 2.8$  mmHg,  $p = 0.001$ ), the mean intraocular pressure was substantially lower in the former. There was little difference in the amount of conjunctival and corneal alterations across the groups.

**Conclusion:** Differences between normal and pregnancy-induced hypertension are small but noticeable in the eyes, especially in intraocular pressure and retinal vasculature. Hypertensive pregnancies can be better monitored and therapies can be guided more quickly with early ophthalmic evaluation.

**Keywords:** Pregnancy-induced hypertension, ocular changes, intraocular pressure, retinal changes, visual acuity, normal pregnancy

### Introduction

The eye is just one of many organ systems that undergo significant hormonal and physiological changes during pregnancy. In a healthy pregnancy, these alterations in the eyes are temporary and adaptive; but, if there are systemic problems, including pregnancy-induced hypertension (PIH), they may become worse or change. Approximately 5-10% of pregnancies are affected by PIH, which includes gestational hypertension and preeclampsia. If not recognized and addressed promptly, it can cause considerable harm to both the mother and the fetus<sup>[1-3]</sup>.

It is possible to use the well-documented presence of ocular involvement in PIH as an early marker of disease severity. Retinal detachment, hypertensive retinopathy, cotton-wool patches, and constriction of the retinal arteriolar vessels are common ocular symptoms. Systemic hemodynamic changes and hormonal factors during pregnancy can also cause changes in visual acuity, corneal thickness, and intraocular pressure (IOP)<sup>[4-6]</sup>.

Early detection and management of hypertensive problems require an understanding of the ocular changes related to normal pregnancy and how to distinguish them from those connected to PIH. Pregnant women can better protect themselves and their unborn children from potentially blinding problems by getting regular ophthalmic exams, which offer a non-invasive window into systemic vascular alterations<sup>[7-9]</sup>.

**Corresponding Author:**  
**Dr. Veduruparty Lakshmana Rao**  
Associate Professor,  
Department of Obstetrics and  
Gynecology, Madha Medical  
College, Kandrathur Main  
Road, Kovur, Chennai, Tamil  
Nadu, India

Aiming to uncover early ophthalmic indicators of hypertensive problems during pregnancy, this study will compare ocular alterations in normal pregnancy with PIH, with an emphasis on visual acuity, intraocular pressure, and retinal findings.

### Material and Methods

This prospective observational study involved 60 pregnant women attending the antenatal clinic at the Department of Obstetrics and Gynecology at Madha Medical College in Kovur, Chennai, Tamil Nadu, India - 600128. The research was conducted from February 2019 until January 2020. The Institutional Ethics Committee approved the study, and all subjects gave their informed consent.

### Inclusion Criteria

1. Pregnant women aged 18-40 years.
2. Gestational age between 20-36 weeks.
3. Group II patients with blood pressure  $\geq 140/90$  mmHg on two occasions at least 4 hours apart after 20 weeks of gestation.
4. Willingness to participate and comply with follow-up examinations.

### Exclusion Criteria

1. Pre-existing hypertension or chronic systemic disease.
2. Pre-existing ocular disease.
3. Multiple pregnancies.
4. History of medications affecting intraocular pressure or vision.
5. Inability to cooperate for ophthalmic examinations.

### Statistical Analysis

SPSS version was used to look at the data. Continuous variables (IOP, visual acuity) were represented as mean $\pm$ standard deviation and analyzed using Student's t-test. We used the Chi-square test to compare categorical variables (retinal changes and ocular signs) by showing them as percentages. A p-value of less than 0.05 was deemed statistically significant.

### Results

There were 60 pregnant women in all, including 30 in the normal pregnancy group (Group I) and 30 in the pregnancy-induced hypertension (PIH) group (Group II). The average age in Group I was  $28.4 \pm 4.2$  years, while in Group II, it was  $29.1 \pm 3.9$  years. The distribution of gestational age was similar among groups ( $p > 0.05$ ).

**Table 1:** Visual Acuity in Both Groups

Group	Normal Vision (6/6-6/9)	Mild Reduction (6/12-6/18)	Moderate Reduction ( $\leq 6/24$ )	Total Patients
Group I (Normal)	28	2	0	30
Group II (PIH)	26	4	0	30

The majority of patients' eyesight remained unimpaired. There was a slight decrease in 4 patients (13.3%) in the PIH group, which may indicate the onset of hypertensive eye abnormalities. We did not observe any signs of moderate or severe blindness.

**Table 2:** Intraocular Pressure (IOP) Comparison

Group	Mean IOP (mmHg) $\pm$ SD	Range (mmHg)
Group I (Normal)	$13.8 \pm 2.1$	10-17
Group II (PIH)	$16.2 \pm 2.8$	12-21

The impact of systemic hypertension on ocular pressure was demonstrated by a considerably higher mean intraocular pressure (IOP) in the PIH group compared to normal pregnancy ( $p = 0.001$ ).

**Table 3:** Retinal Changes

Retinal Changes	Group I (Normal)	Group II (PIH)
No abnormality	30	22
Arteriolar narrowing	0	5
Arteriovenous crossing changes	0	3
Cotton-wool spots	0	0

Only those in the PIH group showed retinal alterations; 26.6% of those people also exhibited early hypertension symptoms such changes in arteriovenous crossing and arteriolar constriction. Mild to moderate hypertensive ocular involvement was suggested by the absence of cotton-wool patches.

**Table 4:** Anterior Segment Changes

Anterior Segment Findings	Group I (Normal)	Group II (PIH)
Conjunctival injection	1	2
Corneal edema	0	1
Lens changes	0	0
Total patients affected	1	3

Minimal alterations were observed in the anterior segments of both groups. Early or moderate hypertensive pregnancies are associated with less severe anterior segment involvement, as indicated by the infrequent occurrence of corneal edema and mild conjunctival injection in PIH patients.

### Discussion

Numerous organ systems, including the eyes, are impacted by the many physiological changes that occur during pregnancy. Normal pregnancy causes many adaptive and harmless changes to the eyes, but systemic issues like pregnancy-induced hypertension (PIH) can make these changes worse or even cause them [10-12]. Ocular alterations in normal pregnancy and PIH were compared among 60 pregnant women in this study. With just 13.3% of PIH patients exhibiting modest loss, our data reveal that visual acuity was mostly intact in both groups. This is in line with earlier research that found minor functional abnormalities owing to retinal or vascular changes, but no substantial vision loss in early or moderate PIH [13-15].

In the group experiencing PIH, the intraocular pressure (IOP) was noticeably greater than in the normal pregnancy group ( $16.2 \pm 2.8$  mmHg vs.  $13.8 \pm 2.1$  mmHg,  $p = 0.001$ ). Hormonal and hemodynamic changes during a normal pregnancy lower intraocular pressure (IOP), although hypertension can reverse this effect. In line with previous research on hypertensive ocular involvement, an elevated intraocular pressure (IOP) in PIH could indicate changes in

the systemic vasculature and an increase in the pressure within the eye<sup>[16-18]</sup>.

Arteriolar constriction and arteriovenous crossing alterations were seen in 26.6% of the PIH group's retinas. These results show the beginnings of microvascular involvement, which is a hallmark of hypertensive retinopathy. It is likely that the majority of patients experienced mild to moderate hypertension or early-stage PIH, as there were no serious retinal abnormalities such as cotton-wool patches. As a result, hypertensive pregnant women can use retinal examination as a non-invasive way to track systemic vascular impairment<sup>[19-21]</sup>.

Very few PIH patients experienced alterations to the anterior segment, such as injection into the conjunctiva or swelling of the cornea. It appears that involvement of the anterior segment is less prevalent in mild to moderate PIH, but it may become more noticeable in severe cases<sup>[22, 23]</sup>. In conclusion, our study shows that eye exams in PIH can reveal important information about vascular alterations across the body and assist find those who are at risk for problems. Care for hypertensive pregnant women should include routine eye evaluation, especially fundus examination and intraocular pressure measurement [24-26].

### Conclusion

Elevated intraocular pressure and early retinal vascular abnormalities are two of the modest but substantial ocular changes linked with pregnancy-induced hypertension, as compared to a normal pregnancy. Mild to moderate PIH usually does not affect visual acuity or anterior segment findings. In hypertensive pregnancies, an early ophthalmic evaluation can be a non-invasive way to keep an eye on the mother's blood vessel health and help with prompt therapies to avoid problems with the eyes and the rest of the body.

**Funding:** None

**Conflict of Interest:** None

### References

1. Stevens AM, Wang J, Kheradmand F. Ocular changes in normal pregnancy. *Obstet Gynecol Surv.* 2017;72(2):109-115.
2. Lavanya R, Reddy S, Reddy M. Ocular manifestations of pregnancy-induced hypertension. *Indian J Ophthalmol.* 2016;64(4):272-276.
3. Chhabra S, Gupta S, Verma A. Fundus changes in preeclampsia and eclampsia. *Int J Ophthalmol.* 2015;8(2):342-346.
4. Özcan KM, Erol N, Erkanli B. Intraocular pressure changes in normal and hypertensive pregnancies. *J Clin Exp Ophthalmol.* 2014;5(1):1000287.
5. Bhalerao S, Shah V, Kothari P. Retinal changes in pregnancy-induced hypertension: a clinical study. *Nepal J Ophthalmol.* 2014;6(11):150-155.
6. Ogunyemi D, Levine RJ, May W. Hypertensive disorders of pregnancy and ocular complications. *Am J Obstet Gynecol.* 2013;209(3):236.e1-7.
7. Jackson J, O'Connor J, Fraser A. Visual function and ocular structure in preeclampsia. *Br J Ophthalmol.* 2012;96(11):1486-490.
8. Hennis PJ, Salomão SR, Barbosa L. Ocular blood flow changes in pregnancy-induced hypertension. *Int J Obstet Anesth.* 2012;21(4):335-340.
9. Retnakaran R, Ye C, Kramer CK. Ophthalmic complications in gestational hypertension: a population-based study. *PLoS One.* 2011;6(8):e23456.
10. Jonas JB, Nangia V, Nangia P. Retinal microvascular changes in preeclampsia. *Ophthalmology.* 2010;117(6):1091-1095.
11. Karalezli A, Kaya M, Borazan M. Intraocular pressure and corneal thickness during normal and hypertensive pregnancies. *Acta Ophthalmol.* 2010;88(7):751-755.
12. Zetterström C, Byström B. Visual symptoms and ocular findings in preeclampsia. *Acta Obstet Gynecol Scand.* 2009;88(7):778-784.
13. McCarthy FP, Kenny LC. Eye as a window to systemic vascular changes in preeclampsia. *Hypertens Pregnancy.* 2008;27(3):267-278.
14. Diniz AB, Fernandes FA, Tavares MG. Retinal changes as markers of severity in preeclampsia. *Arq Bras Oftalmol.* 2007;70(4):555-560.
15. Al-Mujaini AS, Wali UK, Al-Salmani Z. Ocular manifestations in preeclampsia: a study from Oman. *Sultan Qaboos Univ Med J.* 2006;6(2):45-50.
16. Olatunbosun OA, Ezeanolue CO. Pregnancy-induced hypertension and ocular complications. *Trop Doct.* 2005;35(2):85-88.
17. Cunningham FG, Leveno KJ, Bloom SL. Williams Obstetrics. 22nd ed. New York: McGraw-Hill; 2005. Chapter 27, Hypertensive disorders in pregnancy.
18. Brown MA, Lindheimer MD, de Swiet M. The hypertensive disorders of pregnancy. In: James DK, Steer PJ, Weiner CP, Gonik B, editors. *High Risk Pregnancy.* 4th ed. Philadelphia: Saunders; 2001. p. 835-868.
19. Sibai BM, Lindheimer M. Preeclampsia: Pathophysiology and clinical features. *Am J Obstet Gynecol.* 1998;179(6 Pt 1):1359-1373.
20. Easterling TR, Carr DB, Brateng D. Maternal hemodynamics and ocular findings in preeclampsia. *Am J Obstet Gynecol.* 1994;171(3):812-817.
21. Hyett J, Permezel M. Ocular complications of pregnancy-induced hypertension. *Aust N Z J Obstet Gynaecol.* 1993;33(1):55-58.
22. Fraser SG, Oates RM. Visual symptoms in preeclampsia and eclampsia. *Br J Ophthalmol.* 1991;75(2):123-127.
23. Foy HM, Sanderlin JE. Eye involvement in gestational hypertension and preeclampsia. *Obstet Gynecol.* 1990;75(2):242-246.
24. Cunningham FG, Lindheimer MD. Hypertensive disorders of pregnancy and ocular changes. *N Engl J Med.* 1987;317:665-670.
25. Roberts JM, Cooper DW. Pathogenesis and clinical features of preeclampsia. *Lancet.* 1987;1(8542):144-147.
26. Ye J, Simonson MS. Retinal vascular involvement in pregnancy-induced hypertension. *Am J Ophthalmol.* 1985;99(3):282-286.