International Journal of Reproduction, Contraception, Obstetrics and Gynecology
Halim T et al. Int J Reprod Contracept Obstet Gynecol. 2025 Feb;14(2):405-409
www.ijrcog.org
pISSN 2320-1770 | eISSN 2320-1789

DOI: https://dx.doi.org/10.18203/2320-1770.ijrcog20250174

Original Research Article

Correlation between pregnancy-induced hypertension and ocular disorders

Tanzila Halim[1]*, M. Saiful Islam[2], Hasina Khatun[1], Amena Khan[1], M. Mehedi Hasan[3], Umme Kulsum

[1]Department of Obstetrics and Gynecology, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh
[2]Department of Ophthalmology, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh
[3]Department of Epidemiology, DG Health, DGHS, Bangladesh
[4]Department of Fetomaternal Medicine, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh

Received: 15 December 2024
Accepted: 09 January 2025

***Correspondence:**
Dr. Tanzila Halim,
E-mail: thbsmmu@gmail.com

ABSTRACT

Background: Pregnancy-induced hypertension (PIH) is a common condition that can lead to significant maternal and fetal complications. Ocular manifestations, including hypertensive retinopathy, are frequently observed in PIH and may reflect the severity of the disease. This study aimed to evaluate the correlation between PIH and ocular disorders, as well as the associated maternal and fetal outcomes.
Methods: This retrospective observational study was conducted in the department of obstetrics and gynaecology at Mymensingh Medical College Hospital, Mymensingh and BSMMU, Dhaka, Bangladesh, from June 2018 to May 2020. A total of 120 pregnant women diagnosed with pregnancy-induced hypertension (PIH) were included based on specific inclusion criteria, which required a clinical diagnosis of PIH, gestational hypertension, preeclampsia, or eclampsia. Data were collected from medical records, including demographic details, clinical findings and ophthalmic evaluations.
Results: Among the participants, 25% had hypertensive retinopathy, 12.5% exhibited visual field defects and 20.8% had no ocular complications. Severe PIH was significantly associated with ocular disorders ($p=0.001$). Maternal complications occurred in 37.5% of those with ocular changes, while 25% experienced preterm delivery and 20.8% had fetal growth restriction. All associations were statistically significant ($p<0.05$), highlighting the impact of ocular complications on maternal and fetal outcomes.
Conclusions: The study demonstrated a strong correlation between the severity of PIH and ocular disorders, with hypertensive retinopathy being the most prevalent. Ocular complications were linked to adverse maternal and fetal outcomes, highlighting the importance of early ocular screening in PIH patients.

Keywords: Fetal outcomes, Hypertensive retinopathy, Maternal complications, Ocular disorders, Pregnancy-induced hypertension, Visual morbidity

INTRODUCTION

Pregnancy-induced hypertension (PIH) is a significant pregnancy-related condition that encompasses a range of hypertensive disorders, including gestational hypertension, preeclampsia and eclampsia.[1] PIH is characterized by elevated blood pressure during pregnancy and can have severe implications for both maternal and fetal health.[2,3] The global prevalence of PIH varies, but it is estimated that around 5-8% of pregnancies are affected by hypertensive disorders.[4] The pathophysiology of PIH remains complex and multifactorial, with risk factors such as age, obesity, multiple pregnancies and a history of hypertension contributing to its development.[5] PIH is a major cause of maternal morbidity and mortality, often leading to complications such as stroke, organ failure and preterm delivery and can also adversely affect fetal outcomes, causing intrauterine growth restriction (IUGR)

and preterm birth.[3]

Ocular manifestations in PIH are well-documented, with hypertensive retinopathy being one of the most common complications.[6] The increased systemic blood pressure in PIH can lead to retinal changes such as microaneurysms, hemorrhages and exudates, collectively termed hypertensive retinopathy.[7] In more severe cases, retinal detachment, visual field defects, ischemic optic neuropathy and cortical blindness can occur.[5] These ocular complications can be indicative of the severity of the underlying hypertensive disorder and may also signal the potential for more serious maternal and fetal outcomes.[8]

While ocular disorders are frequently observed in PIH patients, the correlation between the severity of PIH and the development of ocular complications remains underexplored.[9] Early detection and monitoring of ocular changes in PIH may serve as valuable tools for assessing the severity of the condition and predicting potential complications.[10] However, despite the clinical relevance, the relationship between PIH severity and ocular manifestations is not consistently addressed in clinical practice and there is limited literature on this topic in resource-limited settings such as Bangladesh.[11]

The impact of PIH on maternal and fetal outcomes is well-established. Severe PIH can increase the risk of preterm delivery, fetal growth restriction and maternal complications such as eclampsia and organ failure.[12] Moreover, the presence of ocular disorders may exacerbate these risks, further emphasizing the need for comprehensive management of PIH that includes ophthalmic evaluation.[13] Given that PIH is common in the study population and that ocular complications can be predictive of more severe outcomes, investigating the association between PIH and ocular disorders is of significant clinical importance.[14]

This objective of this study was to explore the correlation between the severity of PIH and the development of ocular disorders, while also examining the maternal and fetal outcomes associated with these ocular complications. The results could help inform clinical practices, providing insights into the role of ophthalmic screening in managing PIH and improving maternal and fetal health. By highlighting the relationship between PIH and ocular disorders, this research aimed to contribute to the broader understanding of PIH-related complications and their management, ultimately improving patient care and outcomes in populations affected by this condition.

METHODS

This retrospective observational study was conducted in the department of obstetrics and gynecology at Mymensingh Medical College Hospital, Mymensingh and Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh, from June 2018 to May 2020. A total of 120 pregnant women diagnosed with pregnancy-induced hypertension (PIH) were included based on specific inclusion criteria, which required a clinical diagnosis of PIH, gestational hypertension, preeclampsia, or eclampsia. Exclusion criteria ruled out patients with pre-existing systemic diseases such as diabetes mellitus, chronic hypertension, or ocular disorders unrelated to pregnancy. Data were collected from medical records, including demographic details, clinical findings and ophthalmic evaluations.

Ocular assessments were performed during hospital stays and included tests for visual acuity, fundoscopy and specialized investigations like optical coherence tomography (OCT) for suspected retinal issues. The severity of PIH was classified into mild and severe categories based on blood pressure readings and the presence of clinical symptoms or laboratory abnormalities, such as proteinuria or organ dysfunction. Maternal and fetal outcomes, including preterm delivery, fetal growth restriction and maternal complications, were recorded and analyzed for correlation with ocular findings.

Data were entered and analyzed using SPSS version 22. Descriptive statistics, including frequencies and percentages, were used to summarize the data. Chi-square tests were applied to examine associations between categorical variables and a p value <0.05 was considered statistically significant.

RESULTS

Table 1 summarizes the demographic and clinical characteristics of the study population (n=120). The majority of participants (60.8%) were aged 21-30 years, with 17.5% aged ≤20 years and 21.7% aged >30 years. Most were primigravida (65.8%), while 34.2% were multigravida. Severe PIH was more common (77.5%) compared to mild cases (22.5%). Regarding gestational age at diagnosis, 55.8% were diagnosed at ≥34 weeks, while 44.2% were diagnosed earlier (<34 weeks).

Table 1: Demographic and clinical characteristics of the study population (n=120).

Characteristics	Frequency	Percentage
Age group (years)		
≤20	21	17.5
21-30	73	60.8
>30	26	21.7
Gravidity		
Primigravida	79	65.8
Multigravida	41	34.2
Severity of PIH		
Mild	27	22.5
Severe	93	27.5
Gestational age at diagnosis		
<34 weeks	53	44.2
≥34 weeks	67	55.8

Table 2: Ocular disorders observed in PIH patients (n=120).

Ocular Disorder	Frequency	Percentage
Hypertensive retinopathy	30	25.0
Serous retinal detachment (SRD)	10	8.3
Choroidopathy	8	6.7
Visual field defects	15	12.5
Cortical blindness	5	4.2
Ischemic optic neuropathy	7	5.8
No ocular complications	25	20.8

Table 2 presents the ocular disorders observed in PIH patients (n=120). Hypertensive retinopathy was the most common finding, affecting 25% of the patients, followed by visual field defects in 12.5%. Serous retinal detachment (8.3%), choroidopathy (6.7%), ischemic optic neuropathy (5.8%) and cortical blindness (4.2%) were less frequent. Notably, 20.8% of patients had no ocular complications.

Table 3 shows the correlation between the severity of PIH and the presence of ocular disorders among the study population (n=120). Ocular disorders were significantly more frequent in patients with severe PIH (71.7%) compared to those with mild PIH (7.5%), with a statistically significant p value of 0.001. Conversely, the absence of ocular disorders was higher in mild PIH cases (15.0%) than in severe cases (5.8%). Overall, 79.2% of the total population experienced ocular complications, while 20.8% had none, highlighting the strong association between PIH severity and ocular manifestations.

Table 3: Correlation between severity of PIH and ocular disorders (n=120).

Severity of PIH	Ocular disorders present N (%)	No ocular disorders N (%)	Total N (%)	P value
Mild	9 (7.5)	18 (15.0)	27 (22.5)	0.001*
Severe	86 (71.7)	7 (5.8)	93 (77.5)	
Total	95 (79.2)	25 (20.8)	120 (100.0)	

*Statistically significant at p<0.05.

Table 4: Maternal and fetal outcomes based on ocular findings (n=120).

Outcome	Ocular disorders present N (%)	No ocular disorders N (%)	Total n (%)	P value
Maternal complications	45 (37.5)	5 (4.2)	50 (41.7)	0.005*
Preterm delivery	30 (25.0)	8 (6.7)	38 (31.7)	0.010*
Fetal growth restriction	25 (20.8)	2 (1.7)	27 (22.5)	0.002*

*Statistically significant at p<0.05.

Table 4 highlights maternal and fetal outcomes based on the presence of ocular findings in PIH patients (n=120). Maternal complications were significantly more frequent in patients with ocular disorders (37.5%) compared to those without (4.2%), with a p value of 0.005. Similarly, preterm delivery occurred in 25.0% of patients with ocular findings versus 6.7% without (p=0.010) and fetal growth restriction was observed in 20.8% of patients with ocular disorders compared to 1.7% without (p=0.002).

DISCUSSION

This study explored the correlation between pregnancy-induced hypertension (PIH) and ocular disorders in a cohort of 120 pregnant women, along with the maternal and fetal outcomes associated with these ocular complications. Our results demonstrated that hypertensive retinopathy was the most common ocular complication in PIH, with a significant association between the severity of PIH and the presence of ocular disorders. Furthermore, we observed that the presence of ocular complications was linked to adverse maternal and fetal outcomes.

In this study, 25% of the participants with PIH exhibited hypertensive retinopathy, which is consistent with findings from other studies from Bakhda and Janjua et al.[4,15] Hypertensive retinopathy is a well-established manifestation of elevated blood pressure and is characterized by retinal changes such as microaneurysms, exudates and hemorrhages, all of which can serve as indicators of the severity of the hypertensive condition.[16] Our results align with those of Lee et al., who also found a high prevalence of retinopathy in women with PIH.[17] These findings underscore the importance of early ophthalmic evaluation in managing PIH, as ocular changes may reflect the severity of the condition and could help guide treatment strategies.

Serous retinal detachment (SRD) and ischemic optic neuropathy were observed in a smaller subset of patients, similar to the findings by Raposo et al and Bakhda, who reported these complications in women with severe forms of PIH.[8,18] These severe ocular manifestations are typically associated with elevated and poorly controlled blood pressure, suggesting that higher PIH severity increases the risk of such complications. In this study, the severity of PIH was strongly correlated with the presence of ocular disorders, with 71.7% of women with severe PIH exhibiting ocular complications compared to only 7.5% of women with mild PIH. This finding corroborates previous research by Nirupama et al, who noted that severe

hypertension in pregnancy is a significant risk factor for retinal complications.[19]

In our analysis, we found a significant association between ocular disorders and adverse maternal and fetal outcomes. The presence of ocular complications was associated with an increased risk of maternal complications, including preterm delivery and fetal growth restriction (FGR). These findings are consistent with those reported by Seidman et al. and Tharihalli et al, who noted that ocular manifestations, such as hypertensive retinopathy and SRD, often coincide with more severe PIH and, consequently, a higher likelihood of complications like preeclampsia, eclampsia and preterm birth.[20,21] In this study, 37.5% of women with ocular complications experienced maternal complications compared to only 4.2% of those without ocular disorders, highlighting the need for close monitoring and early intervention in PIH patients with ocular manifestations.

Fetal outcomes also showed a marked association with ocular complications. Preterm delivery was observed in 25% of women with ocular disorders, compared to only 6.7% in those without ocular complications and fetal growth restriction was more prevalent in the former group (20.8% versus 1.7%). These results are consistent with the findings of Hernández-Díaz et al, who reported that PIH increases the risk of fetal complications, including FGR and preterm birth.[6] The presence of ocular disorders, particularly in severe PIH, may reflect the underlying pathology of poor placental perfusion and increased systemic vascular resistance, both of which contribute to these adverse fetal outcomes.

In contrast, a study by Uma et al, highlighted the reversibility of ocular changes in mild PIH cases, suggesting that early intervention and careful management of blood pressure can mitigate the severity of ocular and pregnancy-related complications.[22] Our study supports this notion, as women with mild PIH had a significantly lower incidence of severe ocular changes and related maternal and fetal outcomes. However, the progressive nature of severe PIH emphasizes the importance of timely diagnosis and management to prevent irreversible complications.

This study is limited by its retrospective design, which may introduce biases in data collection. The sample size of 120 participants, though adequate, may not fully represent the broader population of women with PIH. Additionally, the study's observational nature prevents the establishment of causal relationships between ocular complications and pregnancy outcomes.

CONCLUSION

In conclusion, our study underscores the significant association between the severity of PIH and ocular disorders, with hypertensive retinopathy being the most common complication. The presence of ocular complications is strongly linked to adverse maternal and fetal outcomes, including preterm delivery and fetal growth restriction. These findings highlight the importance of regular ophthalmic screening in PIH patients to detect ocular changes early and manage the condition more effectively. Further research with larger sample sizes and longitudinal designs is needed to explore the causal relationships between PIH, ocular manifestations and pregnancy outcomes, with the aim of improving the management and outcomes of PIH in pregnancy.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Sibai BM. Diagnosis, prevention and management of eclampsia. Obstet Gynecol. 2005;105(2):402-10.
2. Nagy ZZ. Review of the ophthalmic symptoms of preeclampsia. Develop Health Sci. 2020;3(1):21-3.
3. Banala C, Moreno S, Cruz Y, Boelig RC, Saccone G, Berghella V, et al. Impact of the ACOG guideline regarding low-dose aspirin for prevention of superimposed preeclampsia in women with chronic hypertension. Am J Obstet Gynecol. 2020;223(3):419-e1.
4. Janjua MI, Bano S, Raza A. Retinopathy in pregnancy induced hypertension. Pakistan Journal of Ophthalmology. 2015 Dec 31;31(4).
5. Reddy SC, Nalliah S, Who TS. Fundus changes in pregnancy induced hypertension. Int J Ophthalmol. 2012;5(6):694.
6. Hernández-Díaz S, Toh S, Cnattingius S. Risk of pre-eclampsia in first and subsequent pregnancies: prospective cohort study. BMJ. 2009;338.
7. Rai H, Rahman Z. Incidence of retinal changes in pregnant women due to pregnancy induced hypertension and its correlation with clinical profile. Int J Reprod Contracept Obstet Gynecol. 2020;9(4):1640-6.
8. Bakhda RN. Clinical study of fundus findings in pregnancy induced hypertension. J Fam Med Prim Care. 2016;5(2):424-9.
9. Ge G, Zhang Y, Zhang M. Pregnancy-induced hypertension and retinopathy of prematurity: a meta-analysis. Acta Ophthalmol. 2021;99(8):e1263-73.
10. Karky P, Basnet PS, Basnet A, Sijapati MJ, Manish KC, Pokharel K. Fundus changes in pregnancy induced hypertension. J Univ Coll Med Sci. 2017;5(1):1.
11. Khanom R, Faridi J, Nur J, Akter S, Basu KC. Ocular fundus changes in pregnancy induced hypertension. J Dhaka Med Coll. 2019;28(1).
12. Jones AA, Lippincott JK, Gonzalez MP, Kim JE. Pregnancy-induced hypertension. Retin Choroid Vasc Dis Eye. 2024:437-48.
13. Shah AP, Lune AA, Magdum RM, Deshpande H, Shah AP, Bhavsar D. Retinal changes in pregnancy-

induced hypertension. Med J DY Patil Univ. 2015;8(3):304-7.
14. Ghavidel LA, Mousavi F, Bagheri M, Asghari S. Preeclampsia induced ocular change. International J Women's Health Reprod Sci. 2018;4(6):123-6.
15. Bakhda RN. Ocular manifestations of pregnancy induced hypertension. Delhi J Ophthalmol. 2015;26(2):88-92.
16. Chandran JR, Narayanan IB, Rajan J. Ocular manifestations: are they significant in hypertensive disorders of pregnancy? J Obstet Gynecol India. 2021;71:118-23.
17. Lee H, Yang SW, Kim Y, Shin H, Seo YS, Oh MJ, et al. Risk of retinopathy in women with pregnancy-induced hypertension: a nationwide population-based cohort study of 9-year follow-up after delivery. Am J Obstet Gynecol. 2023;5(7):100985.
18. Raposo JT, Melo BC, Maciel NF, Leite SD, Rebelo ÓR, Lima AM. Serous retinal detachment in pre-eclampsia: case report and literature review. Rev Brasil Ginecol Obstet. 2020;42:772-3.
19. Nirupama R, Divyashree S, Janhavi P, Muthukumar SP, Ravindra PV. Preeclampsia: pathophysiology and management. J Gynecol Obstet Hum Reprod. 2021;50(2):101975.
20. Seidman DS, Serr DM, Ben-Rafael Z. Renal and ocular manifestations of hypertensive diseases of pregnancy. Obstet Gynecol Surv. 1991;46(2):71-6.
21. Tharihalli C, Giraddi RV. Study of renal and ophthalmic manifestations in hypertensive disorders of pregnancy and its outcome. Int J Reprod Contracept Obstet Gynecol. 2017;6(3):993-1002.
22. Uma MS, Bhuvana S, Annamalai R, Muthayya M. Visual morbidity and spectrum of ophthalmic changes in pregnancy induced hypertension. J Fam Med Prim Care. 2022;11(6):2488-92.

Cite this article as: Halim T, Islam MS, Khatun H, Khan A, Hasan MM, Kulsum U. Correlation between pregnancy-induced hypertension and ocular disorders. Int J Reprod Contracept Obstet Gynecol 2025;14:405-9.