Original article:

Evaluation of Ocular Fundus Changes in Pre-Eclampsia and Eclampsia at a Tertiary Care Hospital

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Abstract

Background: Hypertensive disorders of pregnancy, particularly pre-eclampsia and eclampsia, are major contributors to maternal and perinatal morbidity and mortality. These conditions are multisystem disorders characterized by endothelial dysfunction and end-organ involvement, including the visual system. Ocular fundus changes (hypertensive retinopathy-related changes) are clinically important because they may reflect the severity of systemic disease and can be associated with adverse maternal and fetal outcomes, especially in tertiary care settings where severe cases are frequently managed.

Aim: To evaluate ocular fundus changes in pre-eclampsia and eclampsia at a tertiary care hospital.

Material and Methods: This hospital-based observational analytical study included 95 pregnant women diagnosed with pre-eclampsia or eclampsia. Demographic, obstetric, clinical, and laboratory parameters were recorded. Ophthalmic evaluation included assessment of visual acuity, anterior segment examination, pupillary reactions, and dilated fundus examination using direct and indirect ophthalmoscopy. Fundus changes were documented and categorized based on standard hypertensive retinopathy-related findings. Patients were grouped as those with and without fundus changes. Associations between fundus changes and severity indicators (blood pressure, proteinuria, platelet count, renal and liver function tests, and LDH) as well as maternal and perinatal outcomes were analyzed using appropriate statistical tests, with $p < 0.05$ considered significant.

Results: Ocular fundus changes were observed in 23.16% of patients. Fundus changes were significantly more common in eclampsia (40.74%) compared to pre-eclampsia (16.18%, $p = 0.01$). Severe hypertension (SBP ≥160 mmHg), proteinuria ≥3+, thrombocytopenia, elevated serum creatinine, elevated LDH, and ICU admission were significantly associated with fundus changes (all $p < 0.05$). Patients with fundus changes had significantly higher mean systolic and diastolic blood pressure and significantly deranged laboratory parameters, including lower platelet count and higher serum creatinine, uric acid, AST, ALT, and LDH (all $p < 0.05$). Adverse outcomes such as HELLP syndrome (27.27%, $p = 0.04$), acute kidney injury (31.82%, $p = 0.03$), preterm delivery (68.18%, $p = 0.02$), and NICU admission (72.73%, $p = 0.02$) were significantly higher among patients with fundus changes.

Conclusion: Ocular fundus changes were significantly associated with severe pre-eclampsia/eclampsia, multiorgan dysfunction, and adverse maternal–perinatal outcomes. Routine fundus evaluation can serve as a useful adjunct for identifying high-risk patients and may support early risk stratification in tertiary care settings.

Key words: Pre-eclampsia; Eclampsia; Fundus Changes; Hypertensive Retinopathy; Maternal–Perinatal Outcomes.

INTRODUCTION

Pre-eclampsia and eclampsia remain major causes of maternal and perinatal morbidity and mortality, particularly in low- and middle-income settings where delayed recognition, late referral, and limited access to critical care may worsen outcomes. These disorders are not limited to raised blood pressure alone; they represent multisystem syndromes that can involve the brain, liver, kidneys, hematologic system, placenta, and the visual system. Clinically, progression from pre-eclampsia to eclampsia often reflects worsening endothelial dysfunction and end-organ involvement; therefore, early clinical markers of severity are valuable. Ocular evaluation is important because visual complaints may be early warning signs of progression and may correlate with the severity of underlying vascular changes.[1]

The understanding of hypertensive disorders of pregnancy has expanded from a proteinuria-based diagnosis to a broader framework that includes maternal organ dysfunction and neurological or visual symptoms. This approach is especially relevant in tertiary hospitals, where patients frequently present with severe disease, atypical features, or established complications. In such settings, ophthalmic findings can provide additional clinical information for severity assessment and management decisions, particularly in women presenting with headache, blurred vision, altered sensorium, or seizures. Since eclampsia is defined by convulsions occurring in the setting of pre-eclampsia after exclusion of other causes, the presence of visual symptoms and ocular findings becomes clinically significant both as a symptom complex and as an indicator of systemic involvement requiring urgent intervention.[2] International classification systems recognize hypertensive disorders of pregnancy as a spectrum, including chronic hypertension, gestational hypertension, pre-eclampsia, and pre-eclampsia superimposed on chronic hypertension. Within this spectrum, severity is reflected by symptoms, laboratory abnormalities, and evidence of end-organ injury. From a research perspective, ophthalmic abnormalities in pre-eclampsia and eclampsia are not merely local ocular events; rather, they can represent manifestations of generalized vascular dysregulation, endothelial dysfunction, and microvascular injury. Therefore, studying ocular fundus changes in relation to clinical severity and laboratory parameters provides an integrated view of maternal disease burden, especially in tertiary-care populations where severe phenotypes are common.[3]

The pathophysiology of pre-eclampsia is closely linked to abnormal placentation and placental ischemia, leading to release of circulating factors that cause widespread maternal endothelial dysfunction. Angiogenic imbalance, oxidative stress, vasospasm, and microvascular injury contribute to multiorgan manifestations and explain why ocular findings often parallel systemic deterioration. When endothelial injury and microvascular compromise are pronounced, ocular tissues—particularly the retinal and choroidal circulation—may show clinically detectable changes. These fundus abnormalities typically reflect hypertensive retinopathy-related changes such as arteriolar narrowing, arteriovenous crossing changes, hemorrhages, exudates, cotton wool spots, macular edema, papilledema, and, in severe cases, serous retinal detachment.[4]

Ocular manifestations in pre-eclampsia and eclampsia are diverse and may involve the retina, choroid, optic nerve, and cortical visual pathways. Clinically, affected women may present with blurred vision, scotomas, visual field defects, or sudden visual loss, and such symptoms warrant prompt ophthalmic evaluation. Importantly, fundus

changes are clinically useful because they can reflect the degree of microvascular involvement and may correlate with systemic severity and adverse maternal–fetal outcomes. Therefore, systematic fundus examination in women with pre-eclampsia and eclampsia can aid in risk stratification, guide clinical monitoring, and contribute to timely obstetric decision-making in tertiary care settings.[5,6] Present study was conducted to evaluate ocular fundus changes in pre-eclampsia and eclampsia at a tertiary care hospital.

MATERIALS & METHODS

This was a hospital-based observational analytical study conducted among pregnant women diagnosed with pre-eclampsia and eclampsia. The study was carried out in collaboration between the Departments of Obstetrics and Gynecology and Ophthalmology to evaluate ocular fundus changes and their association with disease severity and systemic clinical parameters.

All eligible patients admitted under obstetric emergency, antenatal wards, or intensive care areas were screened and enrolled after fulfilling the selection criteria.

A total of 95 patients with confirmed diagnosis of pre-eclampsia or eclampsia were included in the study. Patients were recruited consecutively from the obstetric units to minimize selection bias. The study population comprised women diagnosed clinically and obstetrically with hypertensive disorders of pregnancy, and all participants underwent detailed ophthalmic evaluation for evidence of ocular fundus changes.

Inclusion criteria

Pregnant women diagnosed with pre-eclampsia or eclampsia and admitted to the tertiary care hospital were included in the study. Patients who were hemodynamically stable enough to undergo ophthalmic examination and who provided informed consent (or consent from a legally authorized representative in emergency situations) were enrolled. Both primigravida and multigravida women were considered eligible.

Exclusion criteria

Patients with pre-existing chronic hypertension, known diabetes mellitus with established diabetic retinopathy, pre-existing ocular trauma, glaucoma, corneal opacity preventing fundus evaluation, pre-existing retinal vascular occlusive disease, uveitis, optic neuropathies, or other posterior segment disorders unrelated to pregnancy were excluded. Patients with seizures due to causes other than eclampsia (e.g., epilepsy, CNS infection, metabolic encephalopathy) were also excluded. Cases in whom adequate ophthalmic examination could not be completed because of poor cooperation or critical instability were excluded from final analysis.

Methodology

All enrolled patients underwent detailed clinical assessment at admission, including demographic profile (age, residence, socioeconomic status), obstetric history (gravidity, parity, gestational age, booking status, previous hypertensive pregnancy), and presenting symptoms. Special attention was given to headache, blurring of vision, diplopia, photophobia, floaters, visual field complaints, seizures, altered consciousness, and edema. General examination included blood pressure recording, pulse rate, respiratory rate, temperature, pallor, icterus, edema, and neurological status. Obstetric examination included uterine size, fetal lie/presentation, fetal heart rate, and assessment of maternal–fetal complications.

Blood pressure was measured using a calibrated sphygmomanometer with the patient in a semi-recumbent position after adequate rest, and repeat readings were taken as per protocol. Severity

stratification was done using systolic and diastolic blood pressure values, presence of seizures, neurological symptoms, urine protein grading, and evidence of end-organ involvement. Mean arterial pressure (MAP) was calculated for correlation analysis. The requirement of antihypertensive drugs, magnesium sulfate therapy, ICU admission, and ventilatory support (if any) was also documented as indicators of disease severity.

Baseline and follow-up investigations relevant to hypertensive disorders of pregnancy were recorded for each patient. These included complete blood count (hemoglobin, total leukocyte count, platelet count), urine albumin/proteinuria grading, serum creatinine, blood urea, serum uric acid, liver function tests (AST, ALT, bilirubin), lactate dehydrogenase (LDH), peripheral smear (where indicated), coagulation profile, and blood glucose. Additional parameters such as oxygen saturation and serum electrolytes were documented when available. These variables were included to assess systemic severity and their possible association with ocular fundus changes.

A comprehensive ophthalmic examination was performed by an ophthalmologist as early as clinically feasible after stabilization of the patient. Visual acuity was assessed in each eye using a Snellen chart (or bedside visual assessment in critically ill patients). Anterior segment examination was performed using torchlight or slit lamp (where possible) to evaluate conjunctiva, cornea, anterior chamber, iris, and lens. Pupillary reactions were documented and intraocular pressure was measured by tonometry when not contraindicated.

Posterior segment evaluation was performed by direct and indirect ophthalmoscopy after pupillary dilatation using mydriatic drops, unless contraindicated due to neurological status or physician advice. Fundus findings were documented in both eyes and included retinal arteriolar narrowing, arteriovenous crossing changes, retinal hemorrhages, cotton wool spots, hard exudates, macular edema, serous retinal detachment, and papilledema. Fundus changes were graded using a standard hypertensive retinopathy grading system (e.g., Keith–Wagener–Barker classification or an equivalent accepted grading method). Fundus photography was performed where feasible for documentation and grading consistency.

A structured proforma was used to record ocular symptoms and fundus findings. Laterality (unilateral/bilateral), grade of fundus changes, macular involvement, optic disc changes, and evidence of retinal or choroidal involvement were documented. These ophthalmic parameters were analyzed in relation to the severity category of pre-eclampsia and eclampsia and correlated with systemic clinical and laboratory parameters.

Maternal outcome parameters included mode of delivery, ICU admission, need for blood transfusion, HELLP syndrome, acute kidney injury, disseminated intravascular coagulation, pulmonary edema, and maternal survival status. Perinatal variables included gestational age at delivery, birth weight, fetal distress, NICU admission, stillbirth, and neonatal outcome at discharge. These outcomes were included to evaluate whether ocular fundus changes were associated with adverse maternal or perinatal prognosis.

Statistical analysis

Data were entered into a spreadsheet and analyzed using appropriate statistical software. Continuous variables were summarized as mean ± standard deviation or median with interquartile range depending on distribution, while categorical variables were expressed as frequency and percentage. Comparisons between groups (pre-eclampsia vs eclampsia; fundus changes present vs

absent) were performed using Chi-square test or Fisher's exact test for categorical variables and independent t-test or Mann–Whitney U test for continuous variables as appropriate. Correlation of ocular fundus changes with blood pressure, proteinuria, platelet count, serum creatinine, liver enzymes, LDH, and disease severity was assessed using suitable correlation coefficients and regression analysis. A p-value of <0.05 was considered statistically significant.

RESULTS

A total of 95 patients diagnosed with hypertensive disorders of pregnancy were evaluated for ocular fundus changes.

In Table 1, the majority of patients belonged to the 20–24 years age group (35.79%), followed by 25–29 years (30.53%), indicating that hypertensive disorders of pregnancy were more frequently observed among young reproductive-age women in the present study. Patients aged ≥30 years constituted 21.05%, while 12.63% were below 20 years. More than half of the participants were primigravida (54.74%), whereas 45.26% were multigravida, suggesting a higher occurrence among first pregnancies. With respect to gestational age at admission, 60.00% were admitted at ≥34 weeks, while 40.00% were admitted before 34 weeks. A higher proportion of women were unbooked (56.84%) compared to booked cases (43.16%). Clinically, 71.58% were diagnosed with pre-eclampsia, and 28.42% with eclampsia, reflecting that nearly one-third of cases had progressed to convulsive disease.

In Table 2, ocular manifestations were common. Diminution of vision was the most frequently reported symptom (32.63%), followed by redness (18.95%), eye pain (16.84%), photophobia (12.63%), and floaters (9.47%). Fundus examination revealed changes suggestive of hypertensive retinopathy, including retinal arteriolar narrowing (22.11%), arteriovenous (AV) crossing changes (17.89%), retinal hemorrhages (13.68%), cotton wool spots (8.42%), and hard exudates/macular involvement (6.32%). Overall, ocular fundus changes were present in 23.16% of patients, while 76.84% had no detectable fundus abnormalities on examination.

In Table 3, a statistically significant association was observed between the severity of hypertensive disorder and ocular fundus changes. Among patients with pre-eclampsia, fundus changes were present in 16.18%, whereas 40.74% of patients with eclampsia showed fundus changes (p = 0.01). Severe hypertension (SBP ≥160 mmHg) was significantly more frequent in patients with fundus changes (81.82%) compared to those without (39.73%, p = 0.00). Similarly, significant proteinuria (≥3+) was more common in the fundus-change group (68.18% vs 32.88%, p = 0.01). Thrombocytopenia was also significantly higher (77.27% vs 38.36%, p = 0.00). Renal dysfunction showed a strong association, with elevated serum creatinine (>1.5 mg/dL) present in 63.64% of those with fundus changes compared to 16.44% without (p = 0.00). Elevated LDH (>600 IU/L) was seen in 72.73% with fundus changes versus 24.66% without (p = 0.00). ICU admission was significantly higher among patients with fundus changes (63.64% vs 28.77%, p = 0.00), suggesting that fundus changes were linked to more severe systemic disease.

In Table 4, patients with ocular fundus changes had significantly higher mean systolic blood pressure (168.45 ± 12.36 mmHg) compared to those without fundus changes (154.28 ± 10.74 mmHg; p = 0.00). Diastolic blood pressure and mean arterial pressure were also significantly higher in the fundus-change group (p = 0.00). Hemoglobin was significantly lower in patients with fundus changes (9.82 ± 1.14

g/dL) than in those without (10.76 ± 1.26 g/dL; p = 0.01). Platelet count was markedly reduced in the fundus-change group (104.18 ± 28.72 ×10³/μL) compared to the no-fundus-change group (156.43 ± 35.81 ×10³/μL; p = 0.00). Renal and hepatic parameters were significantly deranged in patients with fundus changes, including higher serum creatinine, serum uric acid, AST, ALT, and LDH levels (p = 0.00), indicating that ocular fundus changes were associated with multiorgan involvement.

In Table 5, maternal complications were significantly more frequent in patients with fundus changes. HELLP syndrome was observed in 27.27% of patients with fundus changes compared to 9.59% without (p = 0.04), and acute kidney injury occurred in 31.82% versus 12.33% (p = 0.03). Although disseminated intravascular coagulation and pulmonary edema were more frequent among patients with fundus changes, these differences were not statistically significant (p > 0.05). Caesarean delivery was more common in the fundus-change group (72.73% vs 56.16%), but the difference was not statistically significant. Regarding perinatal outcomes, preterm delivery was significantly higher among patients with fundus changes (68.18% vs 39.73%, p = 0.02), and NICU admission was also significantly higher (72.73% vs 43.84%, p = 0.02). Low birth weight and stillbirth were more frequent in the fundus-change group; however, these associations did not reach statistical significance (p > 0.05).

Table 1: Socio-Demographic and Obstetric Profile of Study Participants (n = 95)

Variable	Number (n)	Percentage (%)
Age Group (years)		
<20	12	12.63%
20–24	34	35.79%
25–29	29	30.53%
≥30	20	21.05%
Gravidity		
Primigravida	52	54.74%
Multigravida	43	45.26%
Gestational Age at Admission		
<34 weeks	38	40.00%
≥34 weeks	57	60.00%
Booking Status		
Booked	41	43.16%
Unbooked	54	56.84%
Clinical Diagnosis		
Pre-eclampsia	68	71.58%
Eclampsia	27	28.42%
Total	**95**	**100.00%**

Table 2: Ocular Symptoms and Fundus Findings (n = 95)

Parameter	Number (n)	Percentage (%)
Ocular Symptoms		
Diminution of vision	31	32.63%
Redness	18	18.95%
Eye pain	16	16.84%
Photophobia	12	12.63%
Floaters	9	9.47%
Fundus Findings (Posterior Segment)		
Retinal arteriolar narrowing	21	22.11%
Arteriovenous (AV) crossing changes	17	17.89%
Retinal hemorrhages	13	13.68%
Cotton wool spots	8	8.42%
Hard exudates / macular involvement	6	6.32%
Fundus changes present (overall)	**22**	**23.16%**
Fundus changes absent	73	76.84%

Note: "Fundus changes present" indicates any hypertensive retinopathy or related fundus abnormality in either eye.

Table 3: Association Between Clinical Severity and Ocular Fundus Changes (n = 95)

Variable	Fundus Changes Present n (%) (n=22)	Fundus Changes Absent n (%) (n=73)	p-value
Diagnosis			
Pre-eclampsia (n=68)	11 (16.18%)	57 (83.82%)	
Eclampsia (n=27)	11 (40.74%)	16 (59.26%)	0.01*
Severe Hypertension (SBP ≥160 mmHg)	18 (81.82%)	29 (39.73%)	0.00*
Proteinuria ≥3+	15 (68.18%)	24 (32.88%)	0.01*
Thrombocytopenia (<150,000/µL)	17 (77.27%)	28 (38.36%)	0.00*
Elevated Serum Creatinine (>1.5 mg/dL)	14 (63.64%)	12 (16.44%)	0.00*
Elevated LDH (>600 IU/L)	16 (72.73%)	18 (24.66%)	0.00*
ICU Admission Required	14 (63.64%)	21 (28.77%)	0.00*

*Chi-square/Fisher's exact test applied; statistically significant at $p < 0.05$.

Table 4: Comparison of Mean Clinical and Laboratory Parameters

Parameter	Fundus Changes Present (n=22) Mean ± SD	Fundus Changes Absent (n=73) Mean ± SD	p-value
Systolic BP (mmHg)	168.45 ± 12.36	154.28 ± 10.74	0.00*
Diastolic BP (mmHg)	110.64 ± 8.92	100.37 ± 7.85	0.00*
Mean Arterial Pressure (mmHg)	129.91 ± 9.45	118.34 ± 8.16	0.00*
Hemoglobin (g/dL)	9.82 ± 1.14	10.76 ± 1.26	0.01*
Platelet Count (×10³/µL)	104.18 ± 28.72	156.43 ± 35.81	0.00*
Serum Creatinine (mg/dL)	1.82 ± 0.46	1.12 ± 0.31	0.00*
Serum Uric Acid (mg/dL)	7.96 ± 1.08	6.12 ± 0.92	0.00*
AST (IU/L)	86.42 ± 22.35	54.27 ± 18.16	0.00*
ALT (IU/L)	79.53 ± 19.64	48.16 ± 16.92	0.00*
LDH (IU/L)	756.34 ± 148.25	524.18 ± 132.46	0.00*

*Independent t-test applied; statistically significant at $p < 0.05$.

Table 5: Maternal and Perinatal Outcomes in Relation to Ocular Fundus Changes (n = 95)

Outcome Variable	Fundus Changes Present (n=22) n (%)	Fundus Changes Absent (n=73) n (%)	p-value
HELLP Syndrome	6 (27.27%)	7 (9.59%)	0.04*
Acute Kidney Injury	7 (31.82%)	9 (12.33%)	0.03*
Disseminated Intravascular Coagulation	3 (13.64%)	4 (5.48%)	0.21
Pulmonary Edema	4 (18.18%)	6 (8.22%)	0.18
Cesarean Delivery	16 (72.73%)	41 (56.16%)	0.18
Preterm Delivery	15 (68.18%)	29 (39.73%)	0.02*
Low Birth Weight (<2.5 kg)	14 (63.64%)	30 (41.10%)	0.07
NICU Admission	16 (72.73%)	32 (43.84%)	0.02*
Stillbirth	2 (9.09%)	3 (4.11%)	0.38

*Statistically significant at $p < 0.05$.

DISCUSSION

In the present study, most women were young (20–24 years: 35.79%; 25–29 years: 30.53%) and primigravida (54.74%). This demographic pattern supports the recognized predisposition of first pregnancies to hypertensive disorders and is comparable to observations that nulliparity and baseline maternal characteristics are important contributors to pre-eclampsia risk, as reported by Sibai et al. (1995).[7] More than half of our patients were unbooked (56.84%) and nearly one-third had eclampsia (28.42%), suggesting delayed antenatal detection and referral of severe disease to a tertiary center. This is consistent with the WHO secondary

analysis by Bilano et al. (2014), which demonstrated that lack of antenatal care and nulliparity are associated with higher risk of pre-eclampsia/eclampsia and adverse maternal–perinatal outcomes.[8] Our case-mix (pre-eclampsia 71.58%, eclampsia 28.42%) indicates a relatively severe referral population. Similar tertiary-care datasets have shown that severe hypertensive disorders (including eclampsia and HELLP) contribute disproportionately to maternal morbidity compared with less severe disease, as described by Yıldırım et al. (2011) in their comparison of severe pre-eclampsia, eclampsia, and HELLP syndrome.[9] Regarding symptoms, diminution of vision was the commonest complaint in our study (32.63%), followed by redness (18.95%), eye pain (16.84%), photophobia (12.63%), and floaters (9.47%). Although many PIH cohorts report a large asymptomatic proportion, symptom frequency typically rises in severe disease and referral settings; for example, Ranjan et al. (2014) noted no ocular symptoms in 52.00% of women, with fewer reporting blurred or sudden diminution of vision, highlighting how symptom patterns vary with severity and study setting.[10] The prevalence of ocular fundus changes in our study was 23.16%, and the observed lesions (retinal arteriolar narrowing 22.11%, AV crossing changes 17.89%, retinal hemorrhages 13.68%, cotton wool spots 8.42%, hard exudates/macular involvement 6.32%) are typical of hypertensive retinopathy in pregnancy. Reddy et al. (2012) reported a higher prevalence of retinal changes (59.00%) in PIH and demonstrated significant associations with blood pressure, proteinuria, and severity, suggesting that differences in prevalence can be explained by variability in severity distribution, treatment status, and grading thresholds across populations.[11] A major finding in our study was the strong relationship between fundus changes and clinical severity: fundus changes were significantly more frequent in eclampsia than pre-eclampsia (40.74% vs 16.18%; p=0.01) and were associated with severe hypertension (81.82% vs 39.73%; p=0.00) and proteinuria ≥3+ (68.18% vs 32.88%; p=0.01). This “severity-parallel” trend aligns with the work of Karki et al. (2010), who emphasized that hypertensive fundus changes correlate with clinical severity and fetal risk, underscoring the role of fundoscopy as a practical marker of disease burden.[12] Systemic involvement was also more pronounced among women with fundus changes in our cohort: thrombocytopenia was higher (77.27% vs 38.36%; p=0.00), elevated serum creatinine >1.5 mg/dL was more frequent (63.64% vs 16.44%; p=0.00), and LDH >600 IU/L occurred more often (72.73% vs 24.66%; p=0.00). These findings are clinically consistent with risk prediction frameworks such as the fullPIERS model by von Dadelszen et al. (2011), where platelet count, creatinine, and liver enzymes contribute to identifying women at increased risk of serious adverse maternal outcomes.[13] The continuous-variable comparisons further support fundus changes as a marker of systemic severity: women with fundus changes had significantly higher SBP/DBP/MAP (168.45/110.64/129.91 mmHg), lower hemoglobin (9.82 ± 1.14 g/dL), lower platelet count (104.18 ± 28.72 $\times 10^3/\mu L$), and significantly higher creatinine, uric acid, AST, ALT, and LDH (all $p<0.05$). This clustering of hypertension with hematologic, renal, and hepatic derangements is pathophysiologically consistent with the concept that pre-eclampsia/eclampsia affects the eye as part of a multisystem vascular disorder, as reviewed by Abu Samra et al. (2013).[14] Finally, maternal and perinatal outcomes in our study followed a clear severity gradient: HELLP syndrome (27.27% vs 9.59%; p=0.04), acute kidney injury (31.82% vs 12.33%; p=0.03), preterm

delivery (68.18% vs 39.73%; p=0.02), and NICU admission (72.73% vs 43.84%; p=0.02) were significantly higher in the fundus-change group. This is consistent with evidence that biochemical severity markers such as LDH are associated with complications and poor perinatal outcomes in pre-eclampsia/eclampsia.

CONCLUSION

The present study demonstrates that ocular fundus changes were observed in 23.16% of patients with pre-eclampsia and eclampsia and were significantly associated with severe hypertension, multiorgan dysfunction, and adverse maternal and perinatal outcomes.

Patients with fundus changes had higher blood pressure levels, greater hematological and biochemical derangements, and increased rates of HELLP syndrome, acute kidney injury, preterm delivery, and NICU admission. These findings suggest that fundus changes can serve as an important clinical marker of disease severity in hypertensive disorders of pregnancy. Early ophthalmic evaluation in tertiary care settings may aid timely risk stratification and improve maternal–fetal care.

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