



HISTOPATHOLOGICAL CHANGES IN PLACENTA IN PRE-ECLAMPSIA AND ECLAMPSIA: A PROSPECTIVE OBSERVATIONAL STUDY

Pathology

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ABSTRACT

Background: Pre-eclampsia and eclampsia are serious hypertensive disorders of pregnancy that significantly impact maternal and fetal outcomes, often through changes in placental morphology and histopathology. Understanding these placental alterations is critical for improving perinatal care and outcomes. **Aim:** To evaluate the histopathological changes in placentas from women with pre-eclampsia and eclampsia, correlating findings with clinical parameters. **Methods:** This prospective observational study was conducted at the Department of Pathology, Jhalawar Medical College, Rajasthan, from August 2023 to August 2024. Placentas from 75 women diagnosed with pre-eclampsia (PE) or eclampsia (E) were analyzed. Demographic, obstetric, and clinical data were collected. Placental specimens were grossly and microscopically examined. Key findings such as cord insertion, retroplacental hematoma, infarction, syncytial knots, fibrinoid necrosis, hyalinized villi, and calcification were documented. Data were analyzed using SPSS, with a p-value ≤ 0.05 considered significant. **Results:** Most patients were aged 21–30 years, predominantly primigravida and primiparous. Pre-eclampsia comprised 92% of cases, with 8% eclampsia. Central umbilical cord insertion was common (73.3%). Retroplacental hematoma was observed in 13.3%, and placental infarction in 21.3%. Histologically, syncytial knots (93.3%), fibrinoid necrosis (30.7%), hyalinized villi (12%), and calcification (42.7%) were significant findings. The mean placental weight was 442 grams with an average of 15.7 cotyledons. **Conclusion:** Histopathological changes in the placentas of pre-eclamptic and eclamptic women emphasize the impact of hypertensive disorders on placental morphology and function. Early recognition of these placental alterations can aid in better understanding fetal risks and guide clinical management to improve maternal and fetal outcomes.

KEYWORDS

Placenta, Pre eclampsia, eclampsia, syncytial knots, Fibrinoid necrosis.

INTRODUCTION

The placenta is a highly dynamic fetomaternal organ essential for fetal nourishment, waste removal, and immunological defense. In hypertensive disorders like pre-eclampsia and eclampsia, placental health is compromised both macroscopically and microscopically, often resulting in adverse maternal and perinatal outcomes.^{1,2}

Placentae affected by these conditions exhibit reduced size, weight, thickness, altered cord insertion, increased infarcts, retroplacental hemorrhage, and a range of microscopic abnormalities including increased syncytial knots, fibrinoid necrosis, and calcification.^{3,4}

This study aims to detail these changes and correlate them with the clinical spectrum of pregnancy-induced hypertension.⁵

MATERIALS AND METHODS

STUDY DESIGN & POPULATION:

A hospital-based, prospective observational study over one year, including 75 women >18 years, diagnosed with pre-eclampsia (PE, n=69) or eclampsia (E, n=6) based on standard definitions.

Exclusion Criteria:

Gestational hypertension, chronic hypertension, normotensive patients, and cases lacking necessary reports/consent.

Data Collection:

Demographic (age, gravida, parity), clinical (SBP, DBP, mode of delivery), and obstetric details (history of abortion, PROM) were recorded. Immediately after delivery, placentas were collected, cleaned, and processed for gross and microscopic evaluation as per standard histopathological techniques.

Gross Parameters:

Cord insertion (central/eccentric), presence of retroplacental hematoma (RPH), placental infarction, placental weight (PW), and number of cotyledons (NO. Coty).

Microscopic Parameters:

Presence of syncytial knots, fibrinoid necrosis, hyalinized villi, calcification, and endothelial proliferation.

Statistical Analysis:

Mean, standard deviation, and proportions were calculated. Statistical significance was established using the z-test and p-value <0.05.

RESULTS

Demographic & Clinical Profile:

Most patients were 21–30 years old (68%), primigravida (85.3%), and primiparous (90.7%). Mean age was 26.29 ± 4.91 years. The majority (92%) had PE, and only 8% had Eclampsia.

Gross and Microscopic Findings:

Parameter	Frequency	Percent (%)	Mean($\pm$ SD)/Range
Age (years)			26.29 ± 4.91
Pre-eclampsia (PE)	69	92.0	
Eclampsia (E)	6	8.0	
Primigravida (G1)	64	85.3	Mean= 1.17 ± 0.45
Parity 1	68	90.7	
No h/o Abortion	68	90.7	
PROM Present	25	33.3	
LSCS	67	89.3	
Central Cord Insertion	55	73.3	
Eccentric Cord Insertion	20	26.7	
Retroplacental Hematoma (RPH)	10	13.3	
Placental Infarction	16	21.3	
Placental Weight (g)			442.01 ± 41.72
No. of Cotyledons			15.75 ± 1.95
Syncytial Knots	70	93.3	
Fibrinoid Necrosis	23	30.7	
Hyalinized Villi	9	12.0	
Calcification	32	42.7	
Endothelial Proliferation	0	0	
SBP (mmHg)			142.93 ± 14.87
DBP (mmHg)			89.87 ± 8.62

Key Observations:

- Placental Weight: Mean 442.01g, below the normal range (typically 470–500g), reflecting placental insufficiency.
- Cotyledons: Mean count 15.75, also reduced compared to controls in prior literature.
- Cord Insertion: Majority central (73.3%), rest eccentric. Marginal or velamentous insertions were not observed.

- Microscopic Findings: Syncytial knots in 93.3%, indicative of accelerated maturation/hypoxic stress. Fibrinoid necrosis (30.7%) and calcification (42.7%) signaling chronic ischemic injury. Hyalinized villi observed in 12% of cases.
- No cases exhibited endothelial proliferation.
- Retroplacental hematoma and placental infarction present in 13.3% and 21.3% of cases, respectively, highlighting increased incidences of ischemic injury.
- All results were statistically significant ($p < 0.05$).

DISCUSSION

This study affirms the strong association between pre-eclampsia/eclampsia and characteristic placental changes. These include significant reduction in placental weight, cotyledon number, and increased frequencies of infarction and retroplacental hematoma—each contributing to compromised placental function. Histological findings of increased syncytial nodes, fibrinoid necrosis, and calcification are consistent with a hypoxic-ischemic pattern of injury, often culminating in adverse perinatal outcomes such as low birth weight and preterm delivery.⁷

The predominance of changes in primigravida women in their third decade is concurrent with other Indian and global studies. Central cord insertion was observed in a majority, contrary to some literature where eccentric insertion predominates. The absence of endothelial proliferation may reflect the predominance of milder to moderate forms of pre-eclampsia represented in the sample.⁸

CONCLUSION

Pre-eclampsia and eclampsia are linked to distinct placental lesions, both macroscopically and microscopically. These lesions—decreased weight and cotyledon count, increased syncytial knots, fibrinoid necrosis, hyalinized villi, and calcifications—are critical indicators of placental malperfusion and chronic ischemia. Early histological assessment of the placenta can provide valuable insights into the degree of maternal vascular compromise and aid in risk stratification for fetal outcomes in hypertensive pregnancies.

LIMITATIONS

- Single-center study and limited duration (one year) constrain generalizability.
- Lack of normotensive control group restricts direct comparative analysis.

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