ORIGINAL RESEARCH PAPER
Volume - 14 | Issue - 09 | September - 2025 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

LOCATION OF PLACENTA AS A PREDICTOR FOR HYPERTENSIVE DISEASE OF PREGNANCY

Obstetrics & Gynaecology

Dr Anupriya Deep Ex Resident, Department of Obstetrics and Gynaecology, Dayanand Medical College and Hospital, Ludhiana, Punjab.

Dr Sunil K. Juneja Professor, Department of Obstetrics and Gynaecology, Dayanand Medical College and Hospital, Ludhiana, Punjab.

Dr Kanupriya Jain Ex Associate Professor, Department of Obstetrics and Gynaecology, Dayanand Medical College and Hospital, Ludhiana, Punjab.

Dr Rooprishma Kaur* Assistant Professor, Department of Obstetrics and Gynaecology, Dayanand Medical College and Hospital, Ludhiana, Punjab. *Corresponding Author

ABSTRACT

Introduction: Hypertensive disorders complicate 7–10% of pregnancies and contribute to a maternal death every three minutes worldwide (Kaku et al., 2017; Queenan et al., 2015). **Aim:** To assess placental location on ultrasound as a predictor for hypertensive disorders of pregnancy. **Materials And Methods:** A prospective study was conducted on 100 women between 18–24 weeks of gestation in the Department of Obstetrics and Gynaecology, Dayanand Medical College and Hospital, Ludhiana. Placental location was determined sonographically, and patients were followed for hypertensive disorders. **Results:** Hypertension developed in 55% of women with lateral placenta compared to 33.3% with central placenta ($p = 0.032$). Lateral placenta with hypertension was associated with higher maternal complications, abnormal investigations, preterm delivery, and caesarean section. Neonates of these women had more preterm births, low birth weight, NICU admissions, and lower APGAR scores. **Conclusion:** Lateral placental location is significantly associated with hypertensive disorders and their complications, suggesting its role as a predictive marker.

KEYWORDS

Placental location, Hypertensive disorders of pregnancy, Pre-eclampsia, Predictive marker

INTRODUCTION

Hypertensive disorders of pregnancy (HDP) remain a major contributor to maternal and perinatal morbidity and mortality worldwide. They affect 7–10% of pregnancies (Kaku et al., 2017) and include pre-eclampsia, eclampsia, gestational hypertension, and chronic hypertension. Pre-eclampsia and eclampsia alone account for one maternal death every three minutes globally (Queenan et al., 2015), with significant neonatal consequences such as prematurity, intrauterine growth restriction, and stillbirth.

The placenta plays a central role in the pathophysiology of HDP. Inadequate trophoblastic invasion and impaired remodelling of spiral arteries lead to placental hypoperfusion and systemic endothelial dysfunction, the hallmark of pre-eclampsia. Identifying early, non-invasive predictors of HDP is crucial for surveillance and timely intervention.

Placental location, routinely assessed during obstetric ultrasound, has been suggested as a potential predictor. A lateral placenta may reflect defective implantation, impaired uteroplacental blood flow, and increased risk of hypertensive complications. This prospective study was conducted to assess the association between placental location and the subsequent development of HDP, along with maternal and neonatal outcomes.

MATERIALS AND METHODS

Study Design And Setting

A prospective observational study was conducted in the Department of Obstetrics and Gynaecology, Dayanand Medical College and Hospital, Ludhiana, on 100 pregnant women between 18–24 weeks of gestation. Ethical clearance and informed consent were obtained.

Inclusion Criteria - Singleton pregnancy between 18–24 weeks - Willingness to participate and comply with follow-up

Exclusion Criteria - Autoimmune disorders, lupus anticoagulant, or anticardiolipin antibody positivity - Chronic renal disease or connective tissue disorders - Thyrotoxicosis, uterine anomalies - Alcohol or drug dependence

Data Collection Baseline characteristics recorded included maternal age, BMI, parity, education, occupation, residence, socioeconomic status, antenatal care and history of hypertension.

Placental location was determined by ultrasound: - Central placenta: equally distributed on both sides of the midline - Lateral placenta: ≥75% of mass located on one side

Women were followed throughout pregnancy for development of hypertension, maternal complications, biochemical markers, and fundus examination. Obstetric outcomes and neonatal outcomes were documented.

Statistical Analysis

Categorical variables were compared using the Chi-square test. A p-value <0.05 was considered statistically significant.

RESULTS

Placental Location And Hypertension Of 100 women, 55% with lateral placenta developed hypertension compared to 33.3% with central placenta ($p=0.032$), indicating a significant association.

Maternal Profile Among hypertensive women with lateral placenta, the majority were primigravida (81.8%), urban residents (86.4%), overweight (50%), homemakers (68.2%), and postgraduates (68.2%). Past history of hypertension was reported by 90.9% and family history by 54.5%.

Maternal Complications

Lateral placenta with hypertension was strongly associated with vomiting (90.9% vs. 55.0%, $p=0.008$), headache (68.2% vs. 25.0%, $p=0.005$), blurred vision (40.9% vs. 10.0%, $p=0.023$), pedal edema (59.1% vs. 25.0%, $p=0.026$), and generalized edema (63.6% vs. 30.0%, $p=0.037$).

Laboratory Abnormalities

Women with lateral placenta who developed hypertension had significantly higher rates of:

- Abnormal spot protein:creatinine ratio (59.1% vs. 20.0%, $p=0.001$)
- Deranged renal function (59.1% vs. 10.0%, $p=0.001$)
- Abnormal liver function (72.7% vs. 35.0%, $p=0.005$)
- Raised uric acid (63.6% vs. 30.0%, $p=0.037$)
- Elevated LDH (72.7% vs. 40.0%, $p=0.032$)

Fundus examination revealed hypertensive retinopathy in 40.9% with lateral placenta and hypertension compared to 10.0% in the central placenta group ($p=0.023$).

Table 1 ***Investigations in Hypertensive Patients According to Placental Location***

Investigation	Lateral Placenta (n = 22)	Central Placenta (n = 20)	Total	χ^2	p
Spot protein:creatinine ratio					
Increased	13 (59.1%)	4 (20.0%)	17	6.669	.001
Normal	9 (40.9%)	16 (80.0%)	25		
Renal function test (RFT)					
Abnormal	13 (59.1%)	2 (10.0%)	15	10.969	.001
Normal	9 (40.9%)	18 (90.0%)	27		
Liver function test (LFT)					
Abnormal	16 (72.7%)	7 (35.0%)	23	7.644	.005
Normal	6 (27.3%)	13 (65.0%)	19		
Uric acid					
Abnormal	14 (63.6%)	6 (30.0%)	20	4.752	.037
Normal	8 (36.4%)	14 (70.0%)	22		
LDH					
Abnormal	16 (72.7%)	8 (40.0%)	24	4.582	.032
Normal	6 (27.3%)	12 (60.0%)	18		
Fundus examination					
Mild hypertensive retinopathy	9 (40.9%)	2 (10.0%)	11	5.177	.023

Obstetric Outcomes

Early preterm deliveries were more frequent in the lateral placenta group (63.6% vs. 30.0%, p=0.029). Caesarean section rates were also significantly higher (81.8% vs. 50.0%, p=0.029).

Neonatal Outcomes

Adverse neonatal outcomes were more common with lateral placenta and hypertension:

- Preterm births: 40.0% vs. 23.3%
- Low birth weight: 68.2% vs. 35.0% (p=0.031)
- NICU admission: 86.4% vs. 50.0% (p=0.011)
- Lower APGAR score at 1 minute (mean 5.73 vs. 7.20, p=0.004)

A notable female predominance was observed in this group (68.2% vs. 35.0%, p=0.031).

Table 2 ***Neonatal Outcomes According To Placental Location In Hypertensive Patients***

Outcome	Lateral Placenta (n = 22)	Central Placenta (n = 20)	χ^2 / t	p
Preterm birth	9 (40.9%)	7 (23.3%)	1.573	.210
Low birth weight	15 (68.2%)	7 (35.0%)	4.635	.031
NICU admission	19 (86.4%)	10 (50.0%)	6.438	.011
APGAR score at 1 min (mean ± SD)	5.73 ± 1.21	7.20 ± 1.08	-3.136	.004
Female neonates	15 (68.2%)	7 (35.0%)	4.635	.031

DISCUSSION

This study establishes a significant correlation between lateral placental location and hypertensive disorders of pregnancy. Women with lateral placenta were at greater risk of hypertension, maternal complications, adverse biochemical markers, preterm delivery, caesarean section, and poor neonatal outcomes.

Maternal risk factors Primigravida status, overweight, urban residence, and family history of hypertension increase risk (Landi et al., 2018; Van Middendorp et al., 2013; Bdolah et al., 2014; Endeshaw et al., 2016).

Placental dysfunction and complications Symptoms such as headache, vomiting, edema, and visual disturbances were significantly more frequent in women with lateral placenta and hypertension.

Laboratory markers Proteinuria, deranged renal and liver function, elevated uric acid, and raised LDH were significantly higher in the lateral placenta group (Demirci et al., 2015; Makuyana et al., 2002; Haleema et al., 2019; Kumar & Singh, 2019; Bainbridge & Roberts, 2008; Bulusu & Singh, 2017; Vazquez-Alaniz et al., 2019).

Obstetric And Neonatal Impact Higher rates of preterm birth and caesarean section were observed in lateral placenta hypertensive pregnancies (Madan et al., 2010). Neonates were more likely to be premature, low birth weight, require NICU care, and have poorer APGAR scores. Female predominance was observed (Grigore et al., 2008).

CONCLUSION

Placental location, easily determined by routine ultrasound, is significantly associated with the risk of hypertensive disorders of pregnancy and related adverse outcomes. Lateral placenta is predictive of higher maternal complications, abnormal biochemical markers, increased caesarean rates, preterm birth, and compromised neonatal outcomes. It may serve as a simple, inexpensive, and non-invasive screening tool for closer monitoring, timely diagnosis, and improved maternal and neonatal care.

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