Journal of Cardiovascular Disease Research

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 04, 2024

A PROSPECTIVE STUDY TO KNOW ASSOCIATION OF PLACENTAL IMPLANTATION WITH DEVELOPMENT OF HYPERTENSION IN PREGNANCY

Dr. Harsh Dhorajia[1], Dr. Seema Patel[2], Dr. Amira Sheikh[3], Dr. Vibhuti Jogadia[4]

[1]Third Year Resident, Department of Obstetrics and Gynaecology, GMERS Medical College Sola, Ahmedabad, Gujarat, India

[2]Associate Professor, Department of Obstetrics and Gynaecology, GMERS Medical College Sola, Ahmedabad, Gujarat, India

[3]Senior Resident, Department of Obstetrics and Gynaecology, GMERS Medical College Godhra, Gujarat, India

[4]Senior Resident, Department of Obstetrics and Gynaecology, GMERS Medical College Sola, Ahmedabad, Gujarat, India

Corresponding Author:
Dr. Vibhuti Jogadia
Email: dr.vibhutijogadia@gmail.com

Received: 01/03/2024, **Accepted:** 07/04/2024, **Published:** 14/04/2024

Abstract

Objective- The aim of study is to assess correlation of placental implantation with development of hypertension in pregnancy. The secondary objective was to See the relationship between placental location and complications of PIH such as abnormal Doppler

Study Design-An Observational prospective comparative study was conducted on 300 antenatal women attending the obstetric clinic at our institute.

Results-There is significant association between occurrence of hypertension with location of placenta as out of the 81 women with PIH,56(69.1% %) had laterally located placenta. There is no significant association between USG obstetrics in patients with PIH with location of placenta as out of 81 patients with PIH, 11 had abnormal USG obstetrics &colour Doppler of which 2 had central placenta and 9 had lateral placenta

Conclusion- It is concluded that laterally located placenta on ultrasound at 18 – 24 weeks is associated with increased risk of development of preeclampsia so careful obstetric intervention is essential to decrease the maternal and perinatal morbidity and mortality associated with Hypertension.

Keywords- Pregnancy-related hypertension, placental implantation, preeclampsia

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 04, 2024

INTRODUCTION.

Pregnancy is recognized to induce hypertension in previously normotensive women or exacerbate it in those already hypertensive, often accompanied by proteinuria and/or edema. Hypertensive disorders during pregnancy stand out as a primary contributor to maternal and fetal morbidity and mortality on a global scale [1]. Pre-eclampsia specifically accounts for 15-20% of all preterm deliveries, 12-25% of cases involving fetal growth restriction and infants small for gestational age. Moreover, pre-eclampsia is associated with several major long-term morbidities in newborns and contributes significantly to neonatal mortality, particularly in the context of prematurity-related complications [2,3].

As delineated by the National High Blood Pressure Education Program Working Group in Pregnancy, there exist four distinct classifications of hypertension during pregnancy: chronic hypertension, gestational hypertension, pre-eclampsia and eclampsia syndrome, and pre-eclampsia superimposed on chronic hypertension [4]. Hypertension arising during pregnancy stems from compromised utero-placental circulation. It is posited that inadequate trophoblast infiltration of maternal spiral arteries leads to suboptimal placental perfusion [5].

Various risk factors have been identified to heighten the susceptibility to pre-eclampsia, including but not limited to multiple pregnancies, especially higher-order multiples, enlarged placental size, Antiphospholipid antibody syndrome, chronic hypertension, chronic renal disease, maternal age exceeding 40 years, nulliparity, a history of pre-eclampsia in a prior pregnancy, and pre-existing diabetes. While the highest incidence of pre-eclampsia occurs among primiparous women, the condition exhibits a greater prevalence among multiparous individuals. Maternal complications may encompass imminent eclampsia, eclampsia, pulmonary edema, cardiac failure, cerebrovascular hemorrhage, acute renal failure, disseminated intravascular coagulation (DIC), microangiopathic hemolytic anemia, and placental abruption.

When the placenta is centrally located, both uterine arteries typically exhibit similar function. However, in cases where the placenta is laterally positioned, it is commonly observed that the uterine artery proximal to the placenta demonstrates lower resistance compared to its counterpart on the opposite side. Consequently, in such scenarios, uteroplacental blood flow is predominantly supplied by one artery, while the other artery contributes through collateral circulation [6]. The inadequacy of collateral circulation can lead to deficiencies that may contribute to the development of gestational hypertension and intrauterine growth restriction (IUGR). Among the various methods available for assessing placental localization, ultrasound examination performed between 20 and 24 weeks of gestation stands out as a simple, highly cost-effective, non-invasive, and widely accessible approach [7].

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 04, 2024

MATERIAL AND METHOD:

This was an observational prospective comparative study conducted within the Department of Obstetrics and Gynecology at a tertiary health center in Ahmedabad, Gujarat, spanning from October 2020 to October 2022. A total of 300 cases were recruited based on predefined inclusion and exclusion criteria. Comprehensive clinical histories were obtained, accompanied by general examinations and vital sign assessments. Placental localization was determined via ultrasound imaging. Data were meticulously recorded in a master chart, and descriptive statistical analyses, including percentages, frequencies, and means, were employed for data summarization.

SELECTION CRITERIA

The inclusion criteria for this study encompassed pregnant women who were attending the antenatal clinic at a tertiary care hospital and did not exhibit any high-risk factors. Specifically, only those with singleton pregnancies were eligible for inclusion, and participation required the woman's consent as well as a willingness to engage in follow-up assessments. Conversely, the exclusion criteria comprised pregnant women with gestational age below 20 weeks, those with uterine anomalies, and individuals diagnosed with diabetes, renal disease, history of smoking, bleeding, and coagulation disorder.

RESULTS:

Table No 1: Demographic distribution of cases in study groups.

Parameters		Frequency	Percentage
Age (Years)	18 - 20	10	3.33 %
	21 -25	142	47.33%
	26 -30	96	32.00%
	31 – 35	40	13.33%
	36 - 40	12	4.00%

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 04, 2024

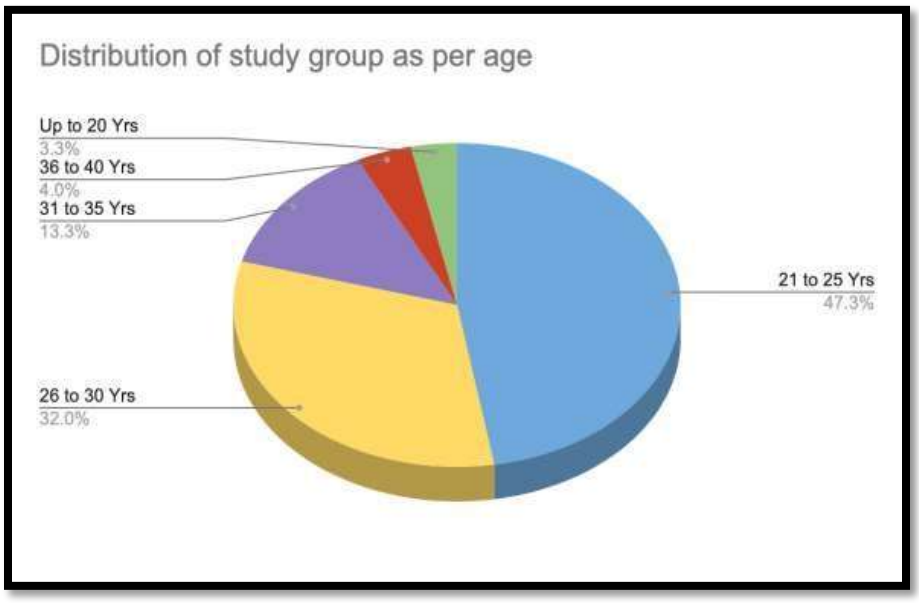

Figure 1. Distribution of study groups as per Age

In our study of 300 patients, maximum cases were in age group 21-25 years (47.3%) followed by age group between 26-30 years (32.0%).

Table 2: Location wise distribution of placenta in study group

Location of Placenta	Number of patients	Percentage (%)
Central	153	51.00%
Lateral	147	49.00%
Total	**300**	**100.00%**

In our study of 300 patients, 153 (51%) had central placenta and 147(49%) had lateral placenta

Table No 3: Relationship between PIH & placental location

Placental Location	PIH		Grand Total
	No	Yes	
Central	128	25	153
Lateral	91	56	147
Grand Total	**219**	**81**	**300**
Chi-Square Test (p Value)		0.000220616	Significant

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 04, 2024

Out of the 81 women with PIH,56(69.1% %) had laterally located placenta, while 25 women (30.9 %) of the remaining women had centrally located placenta.By using chi-Square test p-value <0.05, therefore there is significant association between occurrence of hypertension with location of placenta.

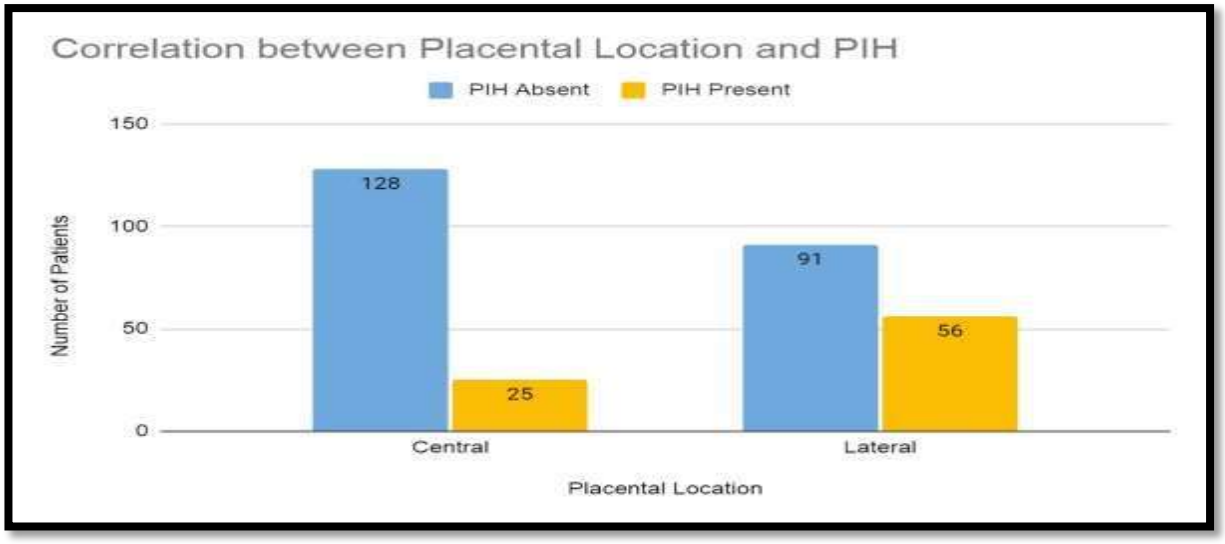

Figure 2. Relationship between PIH & placental location

Table 04. Relationship with Gestational age at increased BP in patients with PIH with location of placenta.

Gestational Age (Weeks)	Placental Location		
	Central	Lateral	Grand Total
Less than 37	23	52	75
37 and above	2	4	6
Grand Total	**25**	**56**	**81**
Chi-Square Test (p Value)		0.8918	Insignificant

Out of 81 patients with PIH, 75 cases had PIH before 37 weeks of gestation of which 23 had central placenta and 52 had lateral placenta. Remaining 6 had PIH after 37 weeks of gestation. However, by using chi square test p-value > 0.05 therefore there is no significant association between gestational age of increased BP in patients with PIH with location of placenta.

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 04, 2024

Table 05: Relationship of degrees of proteinuria in patients with Preeclampsia with location of placenta in study group.

Proteinuria	Placental Location	
	Central	Lateral
Absent (<1+)	14	36
Positive (>1+)	11	20
Grand Total	**25**	**56**
Chi-Square Test (p Value)		0.478502

By using chi square test p-value > 0.05 therefore there is no significant association between degrees of proteinuria in patients with Preeclampsia and location of placenta.

Table 06: Relationship between USG obstetrics &color Doppler in patients with PIH with location of placenta.

Doppler	Placental Location		Grand Total
	Central	Lateral	
Normal	23	47	70
Abnormal	2	9	11
Grand Total	**25**	**56**	**81**
Chi-Square Test (p Value)		0.327325	Insignificant

Out of 81 patients with PIH, 11 had abnormal USG obstetrics &colour Doppler of which 2 had central placenta and 9 had lateral placenta. Remaining 70 had normal USG obstetrics. However, by using chi square test p-value > 0.05 therefore there is no significant association between USG obstetrics in patients with PIH with location of placenta.

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 04, 2024

DISCUSSION

Hypertension occurring during pregnancy is highly prevalent, constituting the most frequent medical complication of gestation and impacting approximately 2-8% of pregnancies [2]. The risk of adverse pregnancy outcomes is primarily, though not exclusively, associated with the diagnosis of preeclampsia [8]. Pre-eclampsia represents a distinctive condition that manifests uniquely during pregnancy, characterized by a pathophysiological phenotype involving placental dysfunction, fetal growth restriction, and the onset of severe yet reversible hypertension [9].

The age distribution of the participants in this investigation aligns with that observed in prior studies such as those conducted by Sandhya et al. in 2013 [10] and Ambastha et al. in 2018 [11], where the majority of cases fell within the 21-25 years of age.

In our investigation, the occurrence of lateral placenta was 49%, while central placenta was observed in 51% of cases, demonstrating similarity to findings reported by Sandhya K. et al. [10]. In their study, out of 300 women, 168 (56%) exhibited laterally positioned placentas, while 132 (44%) displayed centrally located placentas. Similarly, our results are consistent with those of Ambastha et al. [11] in 2018, where lateral placenta was observed in 40.8% of cases and central placenta in 59.2% of cases.

In our investigation, the prevalence of lateral placental placement was 49%, while central placental placement was noted in 51% of cases, mirroring the findings reported by Sandhya K. et al. [10]. Their study, comprising 300 women, revealed that 168 (56%) had laterally positioned placentas, whereas 132 (44%) had centrally located placentas. Similarly, our results are in concordance with those of Ambastha et al. [11] in 2018, where lateral placental placement was observed in 40.8% of cases and central placental placement in 59.2% of cases.

Our study presents evidence supporting a noteworthy correlation between placental laterality and the occurrence of pregnancy-induced hypertension (PIH) in affected individuals. This finding aligns with the results of various studies mentioned previously [12]. Across these investigations, it was consistently observed that women with laterally positioned placentas, as determined by ultrasound examination between 18 to 24 weeks of gestation, exhibit an elevated risk of developing pre-eclampsia [13]. Hence, these findings underscore a significant association between the lateral placement of the placenta and an increased incidence of hypertension during pregnancy.

Conclusion:

In conclusion, the presence of a laterally located placenta detected via ultrasound examination between 18 to 24 weeks of gestation is associated with an elevated risk of developing preeclampsia. Therefore, pregnancies with such placental positioning necessitate meticulous obstetric management to improve outcomes and mitigate the maternal and perinatal

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 04, 2024

morbidity and mortality associated with hypertension. Ultrasonography serves as a straightforward, non-invasive, cost-effective diagnostic tool for identifying high-risk cases and excluding congenital anomalies. Early identification of these patients enables prompt initiation of appropriate treatment and facilitates regular follow-up to monitor maternal and fetal well-being.

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

REFERENCES:

1. Duley L. The Global Impact of Pre-eclampsia and Eclampsia. SeminPerinatol. 2009 Jun;33(3):130–7.
2. Wallis AB, Saftlas AF, Hsia J, Atrash HK. Secular Trends in the Rates of Preeclampsia, Eclampsia, and Gestational Hypertension, United States, 1987- 2004. Am J Hypertens. 2008 May 1;21(5):521–6.
3. Goldenberg RL, Rouse DJ. Prevention of Premature Birth. N Engl J Med. 1998 Jul 30;339(5):313–20.
4. A, Carrara S, Cavaliere A, Ermito S, Dinatale A, Pappalardo EM, et al. Hypertensive disorders of pregnancy. J Prenat Med. 2009 Jan;3(1):1–5.
5. Fleischer A, Schulman H, Farmakides G, Bracero L, Grunfeld L, Rochelson B, et al. Uterine artery Doppler velocimetry in pregnant women with hypertension. Am J Obstet Gynecol. 1986 Apr
   1;154(4):806–12.
6. Naicker T, Khedun SM, Moodley J, Pijnenborg R. Quantitative analysis of trophoblast invasion in preeclampsia. Acta ObstetGynecol Scand. 2003 Aug;82(8):722–9.
7. Lie RT, Rasmussen S, Brunborg H, Gjessing HK, Lie-Nielsen E, Irgens LM. Fetal and maternal contributions to risk of pre-eclampsia:
   population based study. BMJ. 1998 May 2;316(7141):1343–7.
8. Pillay RP S. association of lateral implantation of placenta with development of pre - eclampsia: a prospective study. Journal of Evidence Based Medicine and Healthcare. 2015;2(10):1504-1508.
9. Davey DA, MacGillivray I. The classification and definition of the hypertensive disorders of pregnancy. Am J Obstet Gynecol. 1988 Apr;158(4):892–8.
10. Sandhya K, Madhavi GB, Chandramathi M. Placental laterality as predictor of development of preeclampsia. Am J PhytomedClinTher 2015;3(3):231–236
11. Ambastha V, Sreelatha S, Devi A, Kallesh S, Sumaiah, Kavitha LB, Sandeep, Rajeshwari. Study of association of lateral implantation of placenta with development of preeclampsia and its outcome. The New Indian Journal of OBGYN. 2018; 5(1): 33-37.
12. Priyadarshini A, Upreti P, Nautiyal R, Goyal M. Placental location and development of preeclampsia: a longitudinal study. Int J Reprod Contracept ObstetGynecol2019;8:1283-7

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 04, 2024

13. Placental Laterality and Uterine Artery Doppler Abnormalities for Prediction of Preeclampsia. J ObstetGynaecol India. 2016 Oct;66(Suppl 1):212–6.