



TO COMPARE MORPHOLOGICAL CHANGES OF PLACENTA IN PREGNANCY INDUCED HYPERTENSION WITH NORMAL TERM PLACENTA.

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ABSTRACT

Background: The placenta was a vital feto-maternal organ that connects the developing fetus to the uterine lining, facilitating healthy growth and development. Preeclampsia, a severe form of pregnancy-induced hypertension, can lead to complications such as preterm delivery, IUGR, LBW, placental abruption. **Materials And Methods:** The present study was a prospective observational study to compare morphological changes in 50 normal pregnancy placenta with 50 PIH placenta. Size, shape, surface area and thickness of placenta, number of cotyledons and site of insertion of umbilical cord was noted. Data was analysed using IBM SPSS version 27 software. The results presented was in percentage for qualitative and quantitative data along with mean and standard deviation (SD). **Results:** Mean age of mother was 24.68 ± 4.72 years. Primigravida were 69%. Majority 65% were oval shaped placenta. Site of umbilical cord insertion was eccentric among 76%. The comparison of placental diameter, placental thickness, mean placental weight, placental volume, placental surface area, no of cotyledons and Fetoplacental ratio between PIH group and normal placenta group showed statistically significant difference (p value < 0.05). placental weight, circumference, diameter, thickness, number of cotyledons of placenta decreases significantly in PIH mothers when compared to normal placenta. **Conclusion:** Placental weight, circumference, diameter, thickness, number of cotyledons of placenta decreases significantly in PIH mothers when compared to normal placenta. Examination of the placenta aids in elucidating the specific aetiologies of adverse outcomes, facilitating targeted treatment and preventive strategies for individuals at risk of recurrence in future pregnancies.

KEYWORDS :

INTRODUCTION:

The placenta is a crucial feto-maternal organ that links the developing foetus and the uterine lining during pregnancy.¹ It provides essential support during foetal development, including maintaining homeostasis, oxygen, gas exchange, waste removal, hormone secretion, and haematopoiesis.² The placenta consists of two distinct surfaces: the maternal surface, which is rough and uneven, and the foetal surface, which is smooth and encased by the amnion. The placenta fuses with the uterine mucosa, allowing for the transfer of oxygen and metabolites between maternal and foetal circulations.³

At term, the placenta resembles a circular disc, weighing around 500 grams and taking up about 30% of the uterine wall. It develops from cells derived from both sperm and the egg, which merge to create the foetus.⁴

Hypertension, a common pregnancy-related disorder, accounts for 5-8% of all maternal deaths.⁵ Preeclampsia, a serious manifestation of pregnancy-related hypertension, affects around 5-10% of pregnancies and often results in complications for both the mother and infant. Abnormal placentation in pregnancy-induced hypertension is attributed to insufficient trophoblastic invasion of maternal spiral arteries, leading to high-resistance, low-flow chorio-decidual circulation.⁶

These changes result in morphological modifications in ischaemic placentae and foetal hypoxia, ultimately leading to intrauterine growth restriction (IUGR), which heightens the risk of premature delivery and foetal demise.⁷ Thus, a thorough examination of the placenta during pregnancy and postpartum yields important insights into foetal health.⁸ The

present study was conducted to study morphological changes of placenta in pregnancy induced Hypertension and compared with morphometry of normal term placenta.

Objectives:

- To study the morphological changes of placenta in pregnancy induced hypertension.
- To compare the morphological changes in normal pregnancy placenta with pregnancy induced hypertension placenta.

MATERIALS AND METHODS

The present study was a prospective observational study conducted at the Department of Anatomy in collaboration with the Departments of Obstetrics and Gynaecology and Department of Pathology, Government Medical College, Azamgarh, from May 2023 to April 2025 on morphological changes of placenta in pregnancy induced hypertension compared with normal term placenta in eastern Uttar Pradesh. Sampling unit was Placenta of different gestational age obtained from Department of Obstetrics and Gynaecology of G.M.C. Azamgarh U.P.

The present study included 100 Placenta of different gestational age which were satisfying inclusion criteria were included. Consecutive sampling method was applied.

Inclusion Criteria

- Placenta of Gestational hypertension, Pre-eclampsia, Eclampsia, Chronic hypertension, Superimposed pre-eclampsia ≥ 28 weeks
- Placenta of healthy mother without PIH ≥ 28 weeks

Exclusion Criteria

- Multifetal pregnancy carrying two or more fetuses at the same time.
- Gestational age < 28 week
- Medical condition other than pregnancy induced hypertension
- Pre term delivery occurs before 37 completed weeks of pregnancy.
- New born with congenital anomalies cleft lip, spina bifida.

100 Placenta of full-term pregnancy were collected from the labor room/ operation theatre. Out of 100 placentas, 50 were collected from mothers with no known history of pre-existing hypertension. 50 were collected from mothers with pregnancy induced hypertension.

All placenta were collected immediately after delivery in a clean tray. Placenta was washed in running tap water and make it free of blood clots during washing and excess water was removed with blotting paper. The weight of the placenta was taken using standard weighing machine. Examination of maternal and fetal surface of placenta was done for gross and histological studies. Size, shape, surface area and thickness of placenta, number of cotyledons, presence of infarction, calcification and site of insertion of umbilical cord was noted. Any abnormality of cord and membranes were noted.

Data Analysis:

Data was collected using Microsoft Excel software 2021. Data was analyzed using SPSS version 20.0. (SPSS Inc, Chicago, IL, USA). Descriptive analysis was primarily carried out, where categorical variables was presented in the form of frequencies, percentages, and continuous variables in the form of mean $\pm$ standard deviation. Pearson's Chi-square test was used to measure the association between categorical variables. Students T test was used to compare continuous variables.

RESULTS:

Mean age among mothers with normal placenta was 24.02 years with a SD of 2.85 years. Mean age among mothers of placenta with PIH was 24.34 years with a SD of 3.93 years. Primigravida were 69(69%) and Multigravida were 31(31%). Irregular shape was among 3(3%), oval shape among 65(65%) and round shape was among 32(32%). According to Site of Cord insertion, central was among 8(8%), eccentric among 76(76%) and Marginal was among 16(16%). (Table 1)

According to Morphological changes in placenta, among mothers with normal placenta, Calcification of placenta was present among 6(12%) and infarction was present among 7(14%) and among mothers of placenta with PIH, Calcification of placenta was present among 38(76%) and infarction was present among 17(34%). There was a statistically significant difference between two groups in regards to Morphological changes in placenta. (Table 2)

Table 3 shows that among mothers with normal placenta, mean number of cotyledons was 16.92 with a SD of 0.53 and among mothers of placenta with PIH, mean number of cotyledons was 14.06 with a SD of 0.55. Among mothers with normal placenta, mean weight of placenta was 472.3 grams with a SD of 18.66 grams and among mothers of placenta with PIH, mean weight of placenta was 382.8 grams with a SD of 31.58 grams. Among mothers with normal placenta, mean circumference of placenta was 52.48 cm with a SD of 1.3 cm and among mothers of placenta with PIH, mean circumference of placenta was 45.73 cm with a SD of 0.97 cm. Among mothers with normal placenta, mean diameter of placenta was 19 cm with a SD of 1.13 cm and among mothers of placenta with PIH, mean diameter of placenta was 15.23 cm with a SD of 0.92 cm. Among mothers with normal placenta, mean thickness of placenta was 2.56 cm with a SD of 0.15 cm

and among mothers of placenta with PIH, mean thickness of placenta was 2.07 cm with a SD of 0.12 cm. Among mothers with normal placenta, mean neonatal weight was 2917 grams with a SD of 124.38 grams and among mothers of placenta with PIH, mean neonatal weight was 2182.6 grams with a SD of 130.71 grams. Mean Foetal placental ratio among mothers with normal placenta was 5.72 with a SD of 0.39 and Mean Foetal placental ratio was among mothers of placenta with PIH 6.19 with a SD of 0.36.

There was a statistically significant difference between two groups in regards to number of cotyledons, weight of placenta, circumference of placenta, diameter of placenta, thickness of placenta, neonatal weight and Foetal placental ratio.

Number of cotyledons, weight of placenta, circumference of placenta, diameter of placenta, thickness of placenta, neonatal weight decrease in mothers of placenta with PIH. Foetal placental ratio was more among mothers of placenta with PIH than normal placenta.

Table 1: Distribution Of Study Participants According To Various Variables

Variables	Normal	PIH	Total	P value
Gravida	Primigravida	32(64%)	37(74%)	0.280
	Multigravida	18(36%)	13(26%)	
Shape of Placenta	Irregular	0	3(6%)	0.172
	Oval	32(64%)	33(66%)	
	Round	18(36%)	14(28%)	
Site of Cord insertion	Central	5(10%)	3(6%)	0.619
	Eccentric	36(64%)	40(80%)	
	Marginal	9(18%)	7(14%)	

Table 2: Comparison Of Normal Placenta And Placenta With PIH In Regards To Morphological Changes In Placenta

Morphological changes in placenta		Normal placenta	Placenta with PIH	P value
Calcification of placenta	Absent	44(88%)	12(24%)	0.0001
	Present	6(12%)	38(76%)	
Infarction	Absent	44(86%)	33(66%)	0.019
	Present	7(14%)	17(34%)	

Table 3: Descriptive Statistics Of Study Participants According To Placental Morphometry

Variables	Normal	PIH	P value
Age	24.02 $\pm$ 2.85	25.34 $\pm$ 3.93	0.057
Diameter of Placenta	19 $\pm$ 1.13	15.23 $\pm$ 0.92	0.0001
Circumference of Placenta	52.48 $\pm$ 1.3	45.73 $\pm$ 0.97	0.0001
Thickness of Placenta	2.56 $\pm$ 0.15	2.07 $\pm$ 0.12	0.0001
No of Cotyledons	16.92 $\pm$ 0.53	14.06 $\pm$ 0.55	0.0001
Weight of Placenta	472.3 $\pm$ 18.66	382.8 $\pm$ 31.58	0.0001
Fetal Birth weight	2917 $\pm$ 124.38	2182.6 $\pm$ 130.71	0.0001
FPR	5.72 $\pm$ 0.12	6.19 $\pm$ 0.36	0.0001

DISCUSSION:

The placenta plays a vital role in fetal growth and development; however, its examination is often neglected by physicians, particularly in rural areas such as India. This oversight can hinder early diagnosis and potentially jeopardize lives. In present study, normal placenta specimens were 50(50%) and placenta with PIH specimens were 50(50%). Our study findings were consistent with findings of Furaha A et al (2022)⁹, Gowry TLS et al (2021)¹⁰, Deshpande S et al (2024)¹¹, Parmer KM et al (2019)¹². Oval shape of placenta is predominant. In a study done by Deshpande S et al (2024)¹¹, central placenta was seen among 26(22.8%), Eccentric placenta was seen among 81(71%) and Marginal placenta was seen among 7(6.2%). Eccentric cord insertion being predominant site.

In present study, according to Morphological changes in placenta, among mothers with normal placenta, Calcification of placenta was present among 6(12%) and infarction was present among 7(14%) and among mothers of placenta with PIH, Calcification of placenta was present among 38(76%) and infarction was present among 17(34%). There was a statistically significant difference between two groups in regards to Morphological changes in placenta. Our study findings were comparable with findings of Deshpande S et al (2024)¹¹, Parmar KM et al (2019)¹², Samaddar A et al (2021)¹³, Chhatwal J et al (2018)¹⁴, and Gore CR et al (2018)¹⁵. (Table 4)

Table 4: Comparison Of Morphological Changes In Placenta With Various Studies

Morphological changes in placenta	Normal placenta		placenta with PIH	
	Calcific ation	infar ction	Calcifica tion	infarct ion
Present study	12%	14%	76%	34%
Samaddar A et al (2021) ¹³	6%	10%	44%	46%
Chhatwal J et al (2018) ¹⁴	28.6%	2.4%	45.2%	16.9%
Deshpande S et al (2024) ¹¹	28.07%	-	71.93%	-
Parmar KM et al (2019) ¹²	16%	4%	46%	20%
Gore CR et al (2018) ¹⁵	36.7%	3.3%	86.7%	66.7%

In our present study, there was a statistically significant difference between two groups in regards to number of cotyledons, weight of placenta, circumference of placenta, diameter of placenta, thickness of placenta, neonatal weight and Foetal placental ratio.

Number of cotyledons, weight of placenta, circumference of placenta, diameter of placenta, thickness of placenta, neonatal weight decrease in mothers of placenta with PIH. Foetal placental ratio was more among mothers of placenta with PIH than normal placenta. (Table 5)

Table 5: Comparison Of Study Variables With Various Variables

Studies	Diameter of Placenta		Circumference of Placenta	
	Normal	PIH	Normal	PIH
Present study	19 ± 1.13	15.23 ± 0.92	52.48 ± 1.3	45.73 ± 0.97
Deshpande S et al ¹¹	17.4 ± 1.07	15.68 ± 0.93	51.21 ± 3.93	46.45 ± 2.62
Bar PK et al ¹⁶	19 ± 1.13	15.23 ± 0.92	-	-
Studies	Thickness of Placenta		No of Cotyledons	
	Normal	PIH	Normal	PIH
Present study	2.56 ± 0.15	2.07 ± 0.12	16.92 ± 0.53	14.06 ± 0.55
Deshpande S et al ¹¹	2.88 ± 0.23	2.34 ± 0.28	17.02 ± 1.3	13.95 ± 1.8
Bar PK et al ¹⁶	2.29 ± 0.28	2.1 ± 0.43	-	-
Studies	Age		FPR	
	Normal	PIH	Normal	PIH
Present study	24.02 ± 2.85	25.34 ± 3.93	6.19 ± 0.36	5.72 ± 0.39
Bar PK et al ¹⁶	23.23 ± 2.63	22.35 ± 3.02	-	-
Chatwal J et al ¹⁴	-	-	5.01 ± 0.99	5.24 ± 0.61
Dhakal B et al ¹⁷	25.65 ± 4.39	28.14 ± 5.3	5.3 ± 1.2	4.8 ± 0.9

CONCLUSION:

Morphological changes like calcification and infarction of placenta were significantly more among PIH mothers.

The placental weight, circumference, diameter, thickness, number of cotyledons of placenta decreases significantly in

PIH mothers when compared to normal placenta.

Neonatal weight significantly decreases in mothers of hypertensive disorders. Foetal placental ratio increases in PIH mothers.

This signifies a comprehensive radiographic examination of the placenta during early gestation in pregnant women, which may provide early evidence of pregnancy-induced hypertension (PIH) and intrauterine growth restriction (IUGR), thereby mitigating foetal and maternal morbidity and mortality. Examination of the placenta elucidates the particular aetiologies of bad outcomes, facilitating targeted therapy and preventive strategies for individuals at risk of recurrence in future pregnancies.

REFERENCES

1. Singh I. Textbook of human histology. 10th ed. New Delhi: Jaypee Brother Medical Publishers Pvt Ltd; 2023:146.
2. Burkitt HG, Young B, Health JW, editors. Wheater's Functional Histology: A Text and Colour Atlas. 3rd ed. Edinburgh UK: Churchill Livingstone; 1993.
3. Singh I. Textbook of Human Embryology. 13th ed. New Delhi: Jaypee Brother Medical publishers Pvt Ltd; 2023:102.
4. Dutta DC. Textbook of Obstetrics. 5th Edition Calcutta. India. New Central Book Agency. 2001; 28:224.
5. Dutta DC. Textbook of Obstetrics. 9th ed. New Delhi: Jaypee Brothers Medical Publishers Pvt. Ltd.; 2018
6. Backes CH, Markham, Moorehead KP, Cordero L, Nankervis CA, Giannone PJ. Maternal preeclampsia and neonatal outcomes. J Pregnancy 2011;13(2):1-7.
7. Zhou Y, Danisky C.H, Fisher S.J. Preeclampsia is associated with failure of human cytotrophoblast to mimic a Vascular Adhesion Phenotype J. Clin. Investigation. 1997; 99 (9): 2152-2164.
8. Kouvalainen K, Pynnönen AL, Mäkäraäinen M, Peltonen T. Istukan, sikiökalvojen ja napanuoran paino [Weights of placenta, fetal membranes and umbilical cord]. Duodecim. 1971;87(17):1210-4.
9. Furaha A, Russa D. Comparison of gross morphological and histopathological features of placenta between hypertensive and normotensive pregnant women attending Muhimbili National Hospital. Tanzania J of health R 2022;23(2).
10. Gowri TLS, Prashanti T, Archana A, Rao JSKS. Gross Changes of Placenta in Pregnancy Induced Hypertension and its Clinical Relevance: A Cross-sectional Study. International Journal of Anatomy Radiology and Surgery. 2021;10(4):50-52.
11. Deshpande S. Cross sectional study of morphology and morphometry of human placenta amongst women with pregnancy induced hypertension and without pregnancy induced hypertension. Int J Acad Med Pharm. 2024; 6 (3): 181-187.
12. Parmar KM, Vaishnani H, Shah GV. Morphological Study of Human Placenta in Normal and Hypertensive Pregnancy. Acad. Anat. Int. 2019;5(2):1-4.
13. Samaddar A, Roy UG, Saha I, Mangal S. Histopathological changes in placenta in pregnancy-induced hypertensive patients and correlation with fetal outcome – A tertiary care hospital study. Biomed Biotechnol Res J 2021;5:440-5.
14. Chhatwal J, Chaudhary DN, Chauhan N. Placental changes in hypertensive pregnancy: a comparison with normotensive pregnancy. Int J Reprod Contracept Obstet Gynecol 2018;7:3808-13.
15. Gore CR, Pandey A, Shetty A, Rao R, Paranjape S. A study on histopathological changes in placenta in pre-eclampsia/eclampsia: A case-control study in tertiary care center, western India. Ind J Pathol Oncol, 2018;5(3):385-390.
16. Bar PK, Ghosh S, Gayen P, Mandal S, De A. Morphological study of placenta in hypertensive disorders in pregnancy. Trop J Path Micro 2019;5(6):366-373.
17. Dhakal B, Singh VK, Narasimhan R, Talwar OP. Patho-logical changes in placentas of pregnant females with Gestational hypertension. Ann. Clin. Chem. Lab. Med. 2021;4(1);20-25.