Frontiers in Health Informatics
ISSN-Online: 2676-7104
www.healthinformaticsjournal.com
2024; Vol 13: Issue 8
Open Access

Gross morphological changes in placentae in patients of pregnancy induced hypertension in district Dera Ismail Khan

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Cite this paper as: Shehla Aman, Umme-E-Aiman Saleem, Neelam Roshan, Dilruba mahsud, Sania Azmat, Muhammad Asad, Muhammad Hassan khan, Mir Shahan Mahsud (2024) Gross morphological changes in placentae in patients of pregnancy induced hypertension in district Dera Ismail Khan". *Frontiers in Health Informatics,* (8), 5582-5590

ABSTRACT

OBJECTIVE: Pregnancy induced hypertension is regarded as a risk factor in pregnancy and it adversely affects the development of placenta and growth of fetus. The objective of the study was to observe different morphological parameters in placentae like areas of infarction & calcifications, shape and color in patients of pregnancy induced hypertension and their comparison to placentae of normotensive pregnant females.

Study Design: A Case-control observational study.

Palace And Duration Of Study. Department of anatomy. Gomal medical College DIK from January 2020 to October 2020

MATERIALS & METHODS: The study was conducted at anatomy department Gomal Medical College Dera Ismail Khan. It was a case control study. A total of 150 placentae were taken from labor room of zanana hospital District Head Quarter Teaching Hospital. Patients were divided into three groups. Group A was 50 normotensive pregnant females taken as control, group B was 50 patient with mild PIH. Group C was 50 patients with sever PIH.Placentae were observed on different morphological parameters like infarcted and calcified areas, color of placentae and shape of placentae.

RESULTS: Student T test was applied while comparing quantitative variables of two groups. One-

way Anova was applied while comparing more than two groups. While observing infarcted area in the two groups, there is significant increase in infarcted areas with severity of disease with p-value 0.000**. Qualitative variables were expressed in terms of percentages. Majority of placentae were discoid with oval margins in all the groups with percentages of 64%, 64% and 80% respectively. Color of all the placentae in group A & B were maroon while only 2% of placentae in group C was bluish which was non-significant.

CONCLUSION: Pregnancy induced hypertension severely affects development of placentae as revealed by increase in areas of infarction.

KEY WORDS: Placenta, Morphology, Hypertension , Pregnancy, infarction, shape of placentae, color of placentae.

INTRODUCTION:

Placenta is the vital organ responsible for normal growth of fetus and its survival. Exchange of the blood gases, wastes and nutrients takes place through placenta between mother and fetus. The placenta is the fastest growing organ during pregnancy.[1] Placenta is sometimes described as a mirror of prenatal period and is a vital organ for maintaining the pregnancy, providing essential nutrients to the fetus and removing the waste products from the fetus and thus promoting normal fetal development.[2] Normal placenta when expelled, is maroon red in color. Bluish color shows the cyanosis, pale color shows ischemia and greenish color of placenta and membranes shows meconium staining. Shape of placentae is flattened discoid with either circular or oval outline.[3,4] Fetal surface is covered by shiny, smooth and translucent amniotic membrane.[3]In normal process of aging and maturation of placenta, calcified areas are commonly recognized. Calcification is a constant feature that occurs at variable rate in different parts of placentae but excessive calcification is associated with upto four times increased incidence of fetal distress & may also be associated with Pregnancy Induced Hypertension. In pregnant patients with mild to severe hypertension, irregular placentae and areas of calcification and infarction are observed.[5]Infarction in placentae is initially dark red in color, well demarcated and it is firm in consistency. As the infarction becomes old its consistency hardens and its color changes from red to brown then yellow and finally it becomes white. On cut surface examination, old infarct appears as hard white area with smooth or granular surface.[6]Abnormal development of placenta causes severe disorders of pregnancy like pregnancy induced hypertension (PIH), proteinuria and preeclampsia.[7]Pregnancy induced hypertension (PIH) is the development of hypertension after 20th week of pregnancy in previously normotensive female and no significantly detected proteins in urine.[8] Mild PIH is diastolic B.P 90-99 mm hg, and systolic B.P 140-149 mm Hg. Moderate hypertension is diastolic B.P 100-109 mm Hg and systolic B.P is 150-159 mm Hg and Sever hypertension is diastolic blood pressure 110 mm Hg or greater, systolic blood pressure 160 mmHg or greater.[9]Hypertensive disorders of pregnancy are one of the three top causes of maternal mortality in the world**.** [10] It is estimated that hypertensive disorders of pregnancy causes about 12% of maternal deaths in the world.[11, 12] Pre-eclampsia, a severe form of hypertensive disorder of pregnancy, complicates about 5-7% of all pregnancies in the world[13] and responsible for 15.9% maternal deaths in United states. [14]

Maternal mortality rate was about 276 per 100,00 live births and eclampsia was the direct cause of death in about 12% of these cases.[15] objective of this study was to evaluate the morphological changes in placentae due to hypertensive disorder of pregnancy and to compare the morphology with placentae of normotensive females.

MATERIAL AND METHODS:

Present study was case control study. It was conducted in anatomy department of Gomal Medical College. Duration of study was 10 months from January 2020 to October 2020. Convenient non random sampling technique was applied. Normotensive pregnant women were taken as control (group A) and pregnant women having mild & sever pregnancy induced hypertension were taken as disease group (Group B, C). Patients with essential hypertension, chronic renal disease, chronic liver disease, diabetes mellitus, gestational diabetes, any kind of tobacco smoking, twin pregnancy, incomplete delivery of placenta, abruptio placentae, placenta previa, any other convulsive disorder, any type of congenital abnormalities, hydrops fetalis, premature delivery and intra uterine death were excluded.A total of 150 placentae with cord were collected, 50 from group A as control, 50 from group B and 50 from group C .Placentae were collected from labor room of zanana hospital, DHQ teaching hospital D. I. Khan, immediately after delivery and were preserved in 10% formalin. Samples were shifted to anatomy department Gomal Medical College. Samples were washed with normal saline, mopped with clean cloth and gently pressed to remove any extra blood. Umbilical cord was cut at nearest point to its insertion and membrane were trimmed at the margins.

Placentae were placed in a flat tray and proper inspection was done to see the shape and color of placentae. Each placenta was categorized as a flattened discoid shape with oval or round outline and reddish maroon in color with shiny translucent membranes normally. Any abnormality in shape like circumvellate placentae, succenturiate lobe, bilobed and placenta membranacea were noted. Areas of calcification and infarction were counted and noted.The data was entered into SPSS for analysis. Quantitative variable of areas of infarction and calcification was expressed in terms of mean ± SD. While comparing two groups, Student- t test was used for quantitative variables. One-way Anova was applied to analyze data of more than two groups. Data regarding shape and color of placentae which was categorical data and expressed in terms of percentages.

RESULTS :

The morphological comparison of placentae across different groups (control, mild hypertensive, and severe hypertensive) reveals significant variations. The mean infarcted area was notably higher in hypertensive groups (4.60±0.46 in mild hypertension and 4.84±0.39 in severe hypertension) compared to the control group (0.82±0.28). Statistical analysis indicated highly significant differences between control and hypertensive groups ($p=0.000$), whereas the difference between mild and severe hypertensive groups was non-significant ($p=0.687$). Regarding placenta shape, the control group exhibited 64% oval and 36% round discoid placentae. Similarly, the mild hypertensive group showed 64% oval and 32% round discoid placentae, with 4% presenting a succenturiate lobe. In severe hypertension, 80% of placentae were oval and 20% round. Placental color was predominantly maroon

in all groups, with only 2% of blue discoloration observed in severe hypertension. These findings suggest that hypertension significantly impacts placental morphology, increasing infarction and modifying structural characteristics.

Table 01: Comparison of morphology of placenta in different groups

1-	Mean infarcted area in placenta			0.82±0.28	4.60±0.46	4.84±0.384
2-	Color of placenta	Maroon		100%	100%	98%
		Blue		0%	0%	2%
3-	Shape of placenta	Discoid	Round	36%	32%	20%
			Oval	64%	64%	80%
		Bilobed		0%	0%	0%
		Succenturiate		0%	4%	0%
		Placenta membranacea		0%	0%	0%
		Circumvallate		0%	0%	0%

Areas of infarction and calcification:

Data presented in tables 01 showed mean number of areas of infarction and calcification of group A, B and C as 0.82±0.28, 4.60±0.46 and 4.84±0.384 respectively.

Data present in table 02 describes a p-value between group A and B was 0.000 which is highly significant. According to table 03 p- value between group A and C came out to be 0.000 which is highly significant. P value between group B and C was 0.687 which is non-significant as table 04 revealed.

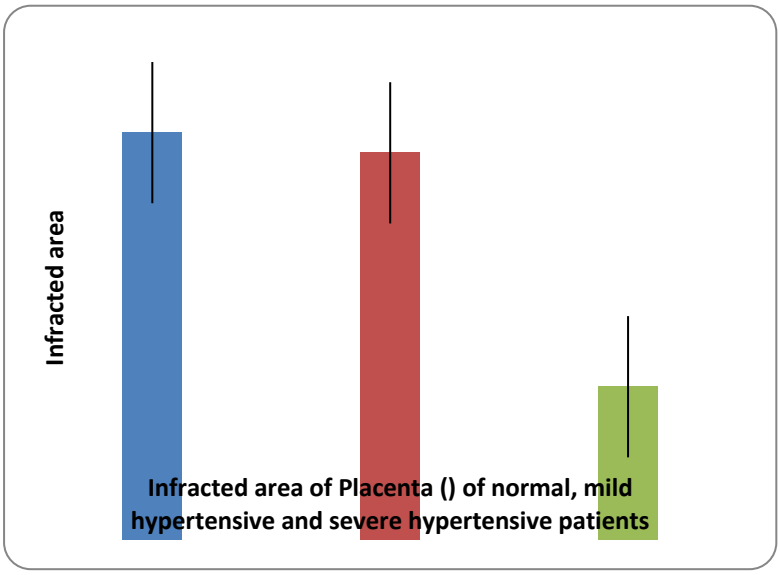

Figure 01: Bar graph showing mean number of areas of infarction and calcification

Table 02: Comparison of group A control vs group B mild hypertensive

Parameter	Control	Mild hypertension	t-value	Sig. level
Mean number of Infarcted area	0.82±0.28	4.60±0.46	7.597	0.000**

Unpaired t test- *Significant. **highly significant

Table 03: Comparison of group A control vs group C Sever hypertensive

Parameter	Control	Severe hypertension	t-value	Sig. level
Mean number of Infarcted area	0.82±0.28	4.84±0.39	7.799	0.000**

Unpaired t test- *Significant. **highly significant

Table 04: Comparison of group B mild hypertensive vs group C Severe hypertensive

Parameter	Mild hypertensive	severe hypertension	t-value	Sig. level

Mean number of Infracted area	4.60±0.46	4.84±0.39	0.406	0.687

Unpaired t test- *Significant. **highly significant

Table 05: ANALYSIS OF VARIANCE OF CONTROL WITH MILD AND SEVER HYPERTENSIVE GROUPS:

Parameters	**Control**	**Mild hypertensive**	**severe hypertension**	**Sig. level**
Mean number of Infarcted area	0.82±0.28	4.60±0.46	4.84±0.39	0.0000**

Unpaired t test- *Significant. **highly significant

Shape and color of placenta:

The data regarding shape and color of placenta are presented in table 01. From the table, it is depicted that in control group 64% of the placentae were discoid with oval margins and 36% of the placentae were discoid with round margins.

In group B 64% of the placentae were discoid with oval margins and 32% of the placentae were discoid with round margins and 4% succenturiate lobe was present.

In group C with sever hypertension 80% placentae were discoid with oval margins and 20% were discoid shape with round margins.

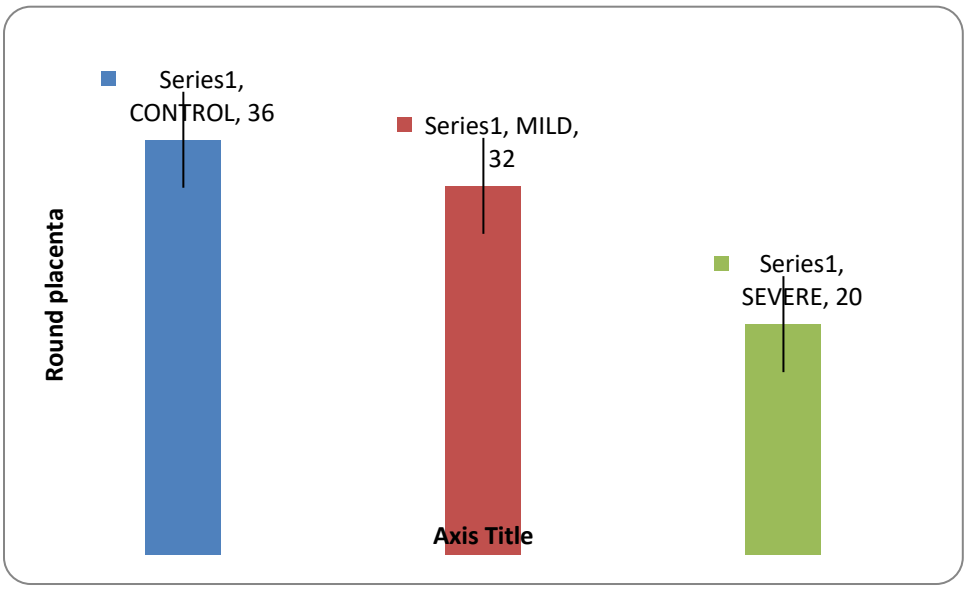

Figure 02:Bar graph showing percentages of rounded shape of placentae in different groups

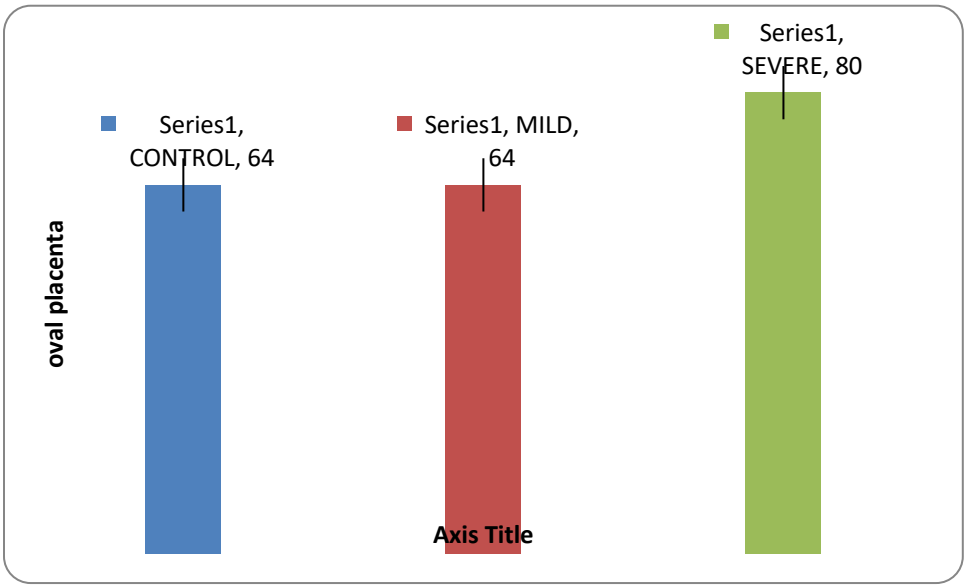

Figure 03:Bar graph showing percentages of oval shape of placenta in different groups

DISCUSSION:

Placenta is the vital organ responsible for normal growth and development of fetus. It is a reflection of fetal life and hazards to which fetus is exposed during intrauterine life. The aetiopathogenesis of hypertensive disorders of pregnancy lies in development of placenta. Placenta shows adaptive response to hypoxia induced injuries but it is insufficient and leads to failure and remains underdeveloped. [16] Placenta reflects the changes that how adversely it is affected during pregnancy. Gross examination of placenta after delivery reveals the changes.In the present study discoid shape placentae with oval margins in group A, B and C, were 64%, 64% and 80% with ±9.24 standard deviation respectively whereas it was discoid shape with round margins in 36%, 32% and 20% of placentae in group A, B and C respectively with standard deviation of ±8.33. Irregular shape placentae were observed in mild hypertensive group only, where it was 4% with succenturiate lobe. Thus, in present study most of the placentae were discoid shape with oval margins in all the three groups. One study showed that shape of placenta in most of the cases was circular in both control and hypertensive group.[17] Another study reported that mostly placentae were discoid shape with circular margins in control group and oval shaped in placentae of eclamptic patients.[18] No clinical significance between oval and rounded shape of placentae was observed in another study.[19] In present study majority of the placentae were oval shape in all groups and even %age of oval shape placentae increases in sever hypertensive group. These observations may be because of regional differences and genetic factors in patients of this area. Color of placentae in all the groups was maroon except in one case in sever hypertension which indicates cyanosis. This was an incidental finding which has no clinical significance. present study mean number of areas of infarction and calcification of group A, B and C are 0.82±0.28, 4.60±0.46 and 4.84±0.384 respectively. There is significant increase in areas of infarction and calcification in

group B and C in comparison to A. These results are in accordance with the results of another study. It revealed a significant increase in areas of infarction and calcification with highly significant p-value [20]. Data revealed that in hypertensive group there are more areas of infarction and calcification than control group. Comparison of group B with group C showed a statistically non-significant value.

Disclaimer: Nil
Conflict of Interest: Nil
Funding Disclosure: Nil

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