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MORPHOLOGICAL CHANGES IN THE PLACENTAE OF HYPERTENSIVE DISORDERS OF PREGNANCY IN MEWAT REGION OF HARYANA.

Anatomy

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ABSTRACT

Background: In India, there are many regions with increased rate of reproduction and poor fetal outcome. One of the most common complications of pregnancy in these regions are Hypertensive disorders of pregnancy. The morphology of the placenta reflects the status of severity of maternal hypertension which might affect the fetal outcome. **Aim:** The study objective was to evaluate and contrast the placental morphological alteration in the placentae from mothers having hypertensive disorders of pregnancy(HDOP) in comparison to placentae from normotensive pregnancies. **Material and Methods:** An observational case control Study was performed. 50 placentae from Normotensive mothers (control group) and 50 placentae from hypertensive mothers (case group) were collected from Obs and Gynae department of a tertiary care hospital. **Results:** It was found that the placenta in hypertensive women in comparison to normotensive women have low placental weight, less maximum diameter, less Surface area, reduced placental volume, paracentral umbilical cord, and a smaller number of cotyledons, increased retroplacental colts. The differences between the groups were statistically significant ($p<0.05$). Statistically significant (p 0.05) differences existed between the groups **Conclusion:** According to the findings of the current study, the placenta obtained from women with hypertensive disorders of pregnancy show significant morphological changes that may lead to impaired fetoplacental circulation. This can lead to adverse fetal outcomes.

KEYWORDS

Hypertensive, Pre-eclampsia, Eclampsia, pregnancy, placenta, morphology

INTRODUCTION:

In India, there are many regions with an increased rate of reproduction and poor fetal outcomes. One of the most common complications of pregnancy in these regions is Hypertensive disorders of pregnancy. Placenta, being a vital organ, is essential for the maintenance of pregnancy and the normal development of the fetus. The morphology of the placenta reflects the status of the severity of maternal hypertension which might affect the fetal outcome. The placenta is the site of the feto-maternal exchange. This exchange occurs as fetal blood travels via capillaries in the stroma of the chorionic villi and maternal blood flows around the terminal villi in the intervillous gap [1]. Since the mother and fetus interface at this site, Maternal or fetal disorders may have placental sequelae[2]. Complications of pregnancy like pregnancy induced hypertension, gestational diabetes, hypothyroidism can be reflected on placenta[3]. The examination of the placenta just after delivery provides a much better understanding of the mother's and baby's prenatal health. The vasospasm on maternal side leads to fetal hypoxia, fetal distress, intrauterine growth retardation and death[4].

The morphological parameters of the placenta are directly proportional to the area exposed for placental attachment to the decidua of the uterus and are also directly proportional to the volume of maternal blood available in the intervillous space for exchange of gases and other substances This study was carried out to analyze and compare the placental morphology of women with pregnancy-induced hypertension (PIH) and normotensive moms.

MATERIALAND METHODS:

After securing Institutional Ethical Committee approval, an Observational type of Case-control study was carried out on 100 placentae gathered from the operation theatre and labour room and Operation theater of the department of obstetrics and gynecology at a Tertiary care hospital. Out of 100 placentae, 50 were from normotensive mothers (Control group) and 50 were collected from mothers with hypertensive disorders of pregnancy (Case group).

Inclusion criteria

- Age 18 years-35 years
- Singleton pregnancy
- Period of gestation- 28 weeks to 42 weeks

Control group - all placentae of normotensive women

Case Group – Placentae of women with the following criteria

1. BP – a previously normotensive woman having systolic blood pressure of ≥140 mmHg and diastolic blood pressure of ≥90 mmHg after 20 weeks of pregnancy
2. Preeclampsia
3. Pre-eclampsia complicated by convulsion (Eclampsia)

Exclusion Criteria

- Period of gestation <28 weeks
- Multifetal pregnancy (twins, triplets etc)
- Chronic secondary hypertension
- Case with gestational diabetes, cardiovascular disorder, renal disease, hepatobiliary disease, thyroid disease, complicating pregnancy

The morphological parameters (weight, thickness, diameter, volume, Surface area, umbilical cord insertion, no. of cotyledons, Retroplacental clots) of placenta were examined for, in both control and case groups.

METHODS

The freshly collected placentae were washed with plain water and pat dried. Placentae were inspected for any abnormality of cord and membrane. After that, the placenta's amnion and chorion were removed. The diameter was measured using a measuring tape. Cotyledons were counted. Weight of the placenta was measured using digital weighing machine in grams. Central and peripheral thickness (cm) of placenta was measured by inserting a needle, the length of the needle outside was measured and then thickness was assessed by subtracting this length from the total length of the needle. The picture of maternal surface of placentae was opened in the ImageJ application for measuring its surface area.

The calibration of the scale in the application was set as 1 cm. The placenta's margin was marked with a free-hand tool, and the option measure (Ctrl + M) was used to calculate its surface area. The surface area of the placentae was expressed as Sq.cm. The water displacement method was used to measure the volume of the placentae in milliliters. The formula, "D/r X 100" was used to calculate umbilical cord insertion percentage. The placenta's radius is r, and D is the minimal distance at which the umbilical cord must be inserted from its edge[1]. A high insertion percentage indicates a central attachment of the

umbilical cord, while a low insertion percentage indicates that the umbilical cord is marginal. Each placenta was categorized based on the insertion percentage- marginal (0%-25%), lateral (26%-50%), medial (51%-75%), and central (76%-100% insertion percentage)[1].

Statistical analysis

Data thus collected for various morphological parameters was statistically analyzed by using SPSS software Version 22. The mean and standard deviation were used to summarize the quantitative data. The data were analyzed using an unpaired t test. It was deemed statistical significance if $P<0.05$.

OBSERVATION AND RESULTS:

The comparison of morphological parameters of placenta between case group and control group has been tabulated in Table **1**. It shows that the placenta of case group was less in weight, diameter, surface area, and volume. Placentas from case group tended to have a smaller number of cotyledons and more clots in the retroplacental area than placentas from control group. This was statistically significant difference ($P<0.05$). Although it was thinner in hypertensive women, there was no statistically significant difference in placenta thickness between the case and control groups ($P>0.05$). In the control group out of 50 placentae, there were 28% central, 48% medial, 20% lateral and 4% marginal cord insertions. In case group, the lateral type of cord insertion was found in 42% Placentae, and the next most common type was medial type of umbilical cord insertion. The difference in umbilical cord insertion between the cases and controls was statistically insignificant.

DISCUSSION:

The placenta is under the same stress and strain as the fetus. Any disease/ health condition that affects a mother also has an impact on the placenta. In the present study, we have analysed and compared the morphological changes in placentae of case group (hypertensive women) with placentae of control group (normotensive women).

In comparison to the control group, the case group's placenta's mean weight (grams) was substantially lower. The same results were observed in other studies.[4-6] The case group's placental diameter (cm) was smaller than the placental diameter of the control group. Other studies showed similar results. [6-8] In our study, we found that the case group's mean central placentae thickness was lower than the control group's, although this difference was statistically insignificant. ($P>0.05$). Our findings contrast with other studies.[1-11] The case group's placental surface area was lower than the control group's placental surface area. This difference was statistically significant. Our findings support those of previous studies[1, 4,7,12]. There was a statistically significant difference in the mean placental volume in our study. (p-value < 0.05) with lower placental volume in the hypertensive group. The finding is similar as that of other studies[4,5,7]. The number of cotyledons in the case group was less than in the control group. Similar results were obtained by other researchers[4,8,13]

The incidence of retroplacental clots and haemorrhage was high in the placentae of the cases group. There was a statistically significant difference between the cases and the controls. Similar results were obtained in the previous studies[6,14].

CONCLUSION:

The placenta reflects the health of the growing fetus as well as the mother which might predict the fetal outcome and maternal morbidity. The present study shows that the placentae from women with hypertensive disorders of pregnancy show significant morphological changes that may lead to impaired feto-placental circulation which can be associated with adverse fetal outcome.

It was also observed that the mean values of all the parameters in the normotensive placentae in the present study were much lower than the average values of all the parameters in the normotensive placentae from the studies carried out in other regions. This may be because of the poor nutritional status of the women in reproductive age group in this region. Mewat region of Haryana is an aspirational region with a considerably high rate of poor fetal outcome. The finding of this study will help clinicians and researchers in understanding the reason for the poor outcome of hypertensive pregnancies.

Table 1: Comparison of morphological parameters between control and case group in the present study.

Parameter		Control group (Mean SD)	Case group (Mean SD)	P value
Weight (gm)		422.7 97.86	350.28 83.54	< 0.05*
Diameter (cm)		18.01 3.65	16.29 2.26	< 0.05*
Thickness (cm)		1.97 0.02	1.93 0.16	> 0.05
Surface Area (Sq.cm)		223.53 44.83	182.51 45.73	< 0.05*
Volume (ml)		338.18 97.61	266.78 86.64	< 0.05*
No. of Cotyledons (No.)		13.58 3.7	10.70 2.82	< 0.05*
Umbilical Cord insertion	Central	14	9	> 0.05
	Medial	24	19	
	Lateral	10	21	
	Marginal	2	1	
Retro placental clots	Present %	22 (44%)	40 (80%)	< 0.05*
	Absent %	28 (56%)	10 (20%)	

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