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RESEARCH ARTICLE

MORPHOLOGY AND MORPHOMETRIC STUDY OF PLACENTA IN PREGNANCY INDUCED HYPERTENSION AND ITS COMPARISON WITH THAT OF NORMAL PREGNANCIES

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ABSTRACT

Pregnancy complications like hypertension or gestational diabetes are reflected macroscopically and microscopically in the placenta. Placental morphologic changes vary substantially in pre-eclampsia and eclampsia that affects the growth of foetus. In pregnancy induced hypertension, there is increased resistance to utero-placental circulation which adversely affects the growth of placenta, which ultimately results in unfavorable outcome of pregnancy. The present study was undertaken to evaluate various gross pathological changes in placentae of pregnancy induced hypertension. These pathological changes were compared with placentae of normal healthy cases. In the study, it is found that the weight, circumference and thickness of placenta were significantly decreased in PIH as compared to the control. The mean minimum distance of cut edge of membrane from margin of placenta and the width of umbilical cord at insertion point on surface of placenta in PIH group was decreased significantly as compared to the control group. It may be attributed to hamper the growth of fetus.

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INTRODUCTION

Placenta is the mirror of maternal and fetal status. It is the most accurate record of the infant's prenatal experience. Pregnancy complications like hypertension or gestational diabetes are reflected in the placenta in a significant way both macroscopically and microscopically (Segupta *et al*., 2009). Pregnancy-induced hypertension (PIH) is the leading cause of maternal mortality and is an important factor in fetal wastage. The severity of hypertension adversely affected both foetal and placental outcome (Udania *et al*., 2004). Several studies have shown that due to maternal vasospasm, utero-placental blood flow is decreased in PIH (Bewly *et al*., 1991). This leads to constriction of fetal stem arteries and has been associated with the changes seen in the placenta of preeclamptic women (Stock *et al*., 1980). Maternal vasospasm leads to fetal hypoxia and accordingly it may lead to fetal distress and fetal death (Thomson *et al*., 1969). Present study was done to find out the morbid changes of the placenta of hypertensive mothers in comparison to normotensive mothers. This study has been undertaken to record the data on the morphology and morphometry of placenta from mothers with PIH and correlate the findings with the birth weight of the new born babies.

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MATERIALS AND METHODS

The study was carried out at Government Medical College Kota, Department of Anatomy in collaboration with Department of Obstetrics and Gynecology. Total 100 placentae were studied during the period of 2011 to 2014. These comprised of 50 placentae from control group of healthy mothers who delivered at term at 36 to 40 weeks of gestation and 50 placentae from pregnancy induced hypertension (PIH) who was having blood pressure 140/90 mm Hg or more with or without oedema / proteinuria. The placenta with attached membranes and umbilical cord was collected soon after delivery, washed in running tap water, labeled, and then fixed with 10% formalin for 4-6 weeks. Gross examination of the placenta was carried out. The placental size, weight, thickness and circumference were noted down. Minimum distance of cut edge of membranes from margin of placenta and Width of umbilical cord at insertion point on surface of placenta were measured.

The data collected from morphological and morphometric studies were recorded. Descriptive statistics was used to analyze the data. They were represented as Mean ± SD (standard deviation). Statistical analysis was done by using GraphPad Quick Calcs software.

Table 1. Comparison of morphological features of placentae of control and pregnancy induced hypertension (PIH) group

Parameters	Control (n=50) (Mean ± SD)	PIH (n=50) (Mean ± SD)	Student t test (p value)
Placental weight (gm)	494.9 ± 59.37	407.1 ± 67.12	(p<0.05) Significant
Placental circumference (mm)	518.2 ± 70.33	381.6 ± 65.72	(p<0.05) Significant
Placental thickness (mm)	28.8 ± 4.03	22.64 ± 4.41	(p<0.05) Significant
Minimum distance of cut edge of membranes from margin of placenta (mm)	61.36 ± 1.71	56.01 ± 1.66	p < 0.05 (Significant)
Width of umbilical cord at insertion point on surface of placenta (mm)	34.90 ± 2.71	25.94 ± 4.28	p < 0.05 (Significant)

Table 2. Mean placental weight in control and pregnancy induced hypertension group in present and studies of different workers

Different workers	Control group		PIH group	
	No. of placentae Studied	Mean Placental Weight (gm)	No. of placentae Studied	Mean Placental Weight (gm)
Udainia et al. (2001)	25	495.00	75	405.67
Majumdar et al. (2005)	50	485.85	50	399.10
Present study	50	494.9	50	407.1

Observations

The present study was undertaken to evaluate various gross pathological changes in placentae of pregnancy induced hypertension. These pathological changes were compared with placentae of normal healthy cases. These placentae were studied for various qualitative and quantitative parameters which were as follows, weight of placenta, circumference of placenta, thickness of placenta, minimum distance of cut edge of membrane from margin of placenta, minimum distance of insertion of umbilical cord on the foetal surface of placenta. In the present study, it was found that the mean placental weight in PIH group is decreased significantly as compared to the control group. The mean placental circumference in PIH group was also significantly low than in control group. The mean placental thickness was found to be 28.8mm in control group as compare to 22.64 mm in PIH group. The difference was statistically significant. The mean minimum distance of cut edge of membrane from margin of placenta and the width of umbilical cord at insertion point on surface of placenta in PIH group were decreased significantly as compared to the control group.

DISCUSSION

The placenta is the only organ in perinatal life, which can be examined without hazards either to the mother or to the baby. The placenta is a paradox, as it is one of the most readily available organs for examination, yet one of the least studied. Majumdar *et al*. had studied the placentae of hypertensive disorders of pregnancy and had reported that the mean placental weight was significantly low in hypertensive cases than in the normotensive controls (Majumdar *et al*., 2005). It corresponds to the findings of Udainia *et al*. (Udainia *et al*., 2001). In our analysis too, it was observed that the mean placental weight in PIH group is significantly low than that of the control group. The mean placental weight in control group was found to be 494.9 ± 59.37 gm while it was 407.1 ± 67.12 gm in PIH group. Deepalaxmi S. *et al*. also observed that the weight of the placenta was less in preeclampsia and eclampsia when compared with normal placenta (Deepalaxmi *et al*., 2014). The present study suggests that the mean placental circumference in cases of placenta with pregnancy induced hypertension (381.6 ± 65.72 mm) was significantly lower than the control group (518.2 ± 70.33 mm). Small placentae may occur in severe pregnancy included hypertension, perhaps reflecting chronic vasospasm of the maternal spiral arterioles (Woodling *et al*., 1976). In our study, it was found that the thickness of placentae in pregnancy induced hypertension group was decreased significantly compared with that of the thickness of normal placentae. The mean placental thickness is found to be 28.8 ± 4.03mm in control group as compare to 22.64 ± 4.41 mm in PIH group. The observations are in agreement with observation of Tewari *et al*. (Tewari *et al*., 1997). He observed that placental thickness was significantly less in preeclampsia (32.7 ± 6.5 mm) cases.

In the present study, it was found that the mean minimum distance of cut edge of membrane from margin of placenta was 61.36 ± 1.71 mm in control and 56.01 ± 1.66 mm in placentae of PIH group. Thus mean minimum distance of cut edge of membrane from margin of normal placenta in PIH group was decreased significantly as compared to the control group. The mean width of umbilical cord at insertion point on surface of normal placentae was 34.90 ± 2.71 mm and 25.94 ± 4.28 mm in placentae from PIH cases. So the width of umbilical cord at insertion point on surface of placenta in PIH group was decreased significantly as compared to the control group. It may be attributed to hamper the growth of fetus.

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