

Placenta in Normal and Pregnancy Induced Hypertension in Relation to its Clinical Significance: A Gross Study

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Abstract

Introduction: Placenta is the most important and vital organ of intrauterine life. It plays important respiratory, nutritive, and excretory function during fetus development. Pregnancy induced hypertension (PIH) is one of the common problems in pregnancy and having adverse effect on placenta and leads so adverse fetus outcomes.

Purpose of Study: This study was conducted to study gross changes of placenta in PIH mothers and comparison with normal blood pressure group mothers and to derive conclusion for preventing adverse outcomes.

Methods of Study: This study was conducted in 50 normal (control group) and 50 PIH cases with their placenta after delivery collected and grossly examined for various variables and comparison was made using EpilInfo 7 software.

Results: As compare to control group, in PIH group mothers mean placental weight, volume, diameter, thickness, mean umbilical cord length, and mean cotyledon number were less. In PIH umbilical cord attachment was eccentric to marginal more rather than a central attachment. PIH group shows altered shape significantly like oval or irregular as compare to control and also a significant proportion of calcification, hemorrhage, and infarcted area ($P < 0.05\%$).

Conclusion: PIH affects placenta adversely and leads significant gross changes as compared to control group. This study concludes that fetus, placenta, and PIH interlinked and this study provides useful adjunct in planning and management of future pregnancy in hypertensive women.

Key words: Calcification, Eclampsia, Fetus, Infarction, Pregnancy Induced Hypertension, Placenta, Preeclampsia, Umbilical cord

INTRODUCTION

During fetal development, until the organs become functional, the placenta does most nutritive and respiratory supportive function to fetus. These include maintenance of homeostasis, provision of oxygen and gaseous exchange, waste removal, hormonal secretion and hemopoiesis, etc.¹

Hence, fetus proper growth and development depend on balance between fetus, placenta, and maternal unit.²

Placenta examination that's why reflects what had happened with it, when it was in mother's womb and what is going to happen with fetus in future and so in future pregnancy, fetus adverse outcome can be prevented. It has been observed that in pregnancy induced hypertension (PIH) maternal uteroplacental blood flow is decreased (by maternal vasospasm) and so leads fetal stem artery constriction leads adverse changes in placenta and adverse fetus outcome.³

MATERIALS AND METHODS

The study was conducted in 100 placentas. Among them, 50 mothers with uncomplicated pregnancy and 50 with PIH were selected randomly from in patients of the Obstetrics and Gynecology Department at tertiary care hospital.

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These two groups considered as control normal group and PIH group. Control group pregnant women having normal blood pressure, no proteinuria, and no edema. PIH group was having blood pressure at or above 140/90 mm hg on at least two occasions with 6 h interval for measurement after 20 weeks of the present pregnancy with or without proteinuria, edema, convulsion, or coma.

Clinical data with history and complaints obtained from case records along with hematological and biochemical laboratory investigations were also recorded.

After delivery placenta along with attached membrane and umbilical cord collected immediately, washed in tap water, blood clots were removed and mopped with cotton and was left for fixation in 10% formal saline for 24-48 h. Placenta than examined grossly along with palpation for various parameters such as shape of placenta, site of insertion of umbilical cord, mean umbilical cord length in cm, mean number of cotyledons, calcification, infarction of >5% area, weight of placenta in grams, thickness of placenta in cm, mean placental diameter, placenta volume, hemorrhage and hematoma.

Membranes were trimmed, and the umbilical cord was cut at distance of 5 cm from site of insertion. Placenta weight was measured in gram using weighing machine.

The diameter was calculated as mean of two maximum diameters that were measured at right angles to each other.⁴ The placental thickness was measured in cm by inserting needle in central, middle and peripheral zone, and mean thickness calculated from that.⁵

The volume of placenta was measured using water displacement method.⁵ After keeping placenta in formalin for about week, cotyledons were separated from the maternal surface of decidual septa by gentle pressure and then counted.⁶ The data were analyzed in both groups by Chi-square test using EpiInfo 7 software. The $P < 0.05$ was taken as statistically significant.

RESULTS

In our study, among the PIH group, 40 cases were of preeclampsia, seven cases of gestational hypertension and three cases were of eclampsia. In both groups' mothers, majority belongs to age group between 20 and 30 years.

Of the 50 control group, 20 (40%) were primigravida and 30 (60%) were multigravida, and of 50 PIH group, 35 (70%) were primigravida and 15 (30%) were multigravida. This shows that in this study, PIH was more

common in primigravida. Mean systolic blood pressure in control group was 122 and in PIH it was 152. Mean diastolic blood pressure in control group was 80 and in PIH it was 98 mm hg.

Placental weight, volume, diameter, and thickness value reported in tabulated form in both groups (Table 1).

The umbilical cord findings reported as tabulated form in both groups (Table 2).

After reporting above findings finally placenta shape, calcification, infarction, hemorrhage, and mean cotyledon number reported in Table 3.

DISCUSSION

Jain *et al.* and Manjunatha *et al.* found that 45.91% of control and 54.09% of PIH mothers were primigravida. In our study, 40% of control and 70% of PIH group

Table 1: Placenta weight, volume, diameter, and thickness

Parameter	Control group (50 patient)	PIH group (50 patient)	P
Mean placenta weight	512 g	410 g	Significant
Mean placenta volume	520 ml	418 ml	Significant
Mean placenta diameter	17.5 cm	14.5 cm	Significant
Mean placenta thickness	2.60 cm	2.20 cm	Significant

PIH: Pregnancy induced hypertension

Table 2: Umbilical cord findings

Parameter	Control group (50 patient)	PIH group (50 patient)	P
Central umbilical cord insertion	41	20	Significant
Marginal umbilical cord insertion	01	08	Significant
Eccentric umbilical cord insertion	08	22	Significant
Mean umbilical cord length in cm	26.5 cm	22.5 cm	Significant

PIH: Pregnancy induced hypertension

Table 3: Placenta shape, calcification, infarction, hemorrhage, cotyledon number findings

Parameter	Control group (50 patient)	PIH group (50 patient)	P
Circular shape placenta	32	20	Significant
Oval shape placenta	18	08	Significant
Irregular shape placenta	00	22	Significant
Infarction>5% area	00	10	Significant
Calcification	08	18	Significant
Mean cotyledon number	19	15	Significant
Hemorrhage	06	12	Significant

PIH: Pregnancy induced hypertension



Figure 1: Gross image of placenta of severe pregnancy induced hypertension. The figure showing irregular shape placenta with reduced weight and areas of hemorrhage

were primigravida which is comparable and it can be stated that primigravida most commonly affected with PIH (Figure 1).^{7,8}

In our study, PIH group showing oval and irregular shape placenta more as compared to circular shape. Whereas control group showing circular shape in majority which is comparable with Dadhich *et al.* study.⁹

The incidence of marginal and eccentric cord insertion more in PIH group as compare to control group which correlates with Pretorius *et al.* study.¹⁰ In our study, mean umbilical cord length is 4 cm less in PIH group as compare to control group that is similar to study by Jain *et al.*⁷

As compare to control group, PIH group showing mean cotyledon number less that is similar to study by Baloch *et al.*¹¹ The calcification was present in both groups but PIH showing more in number similar to Manjunatha *et al.* study.⁸

Mean placental weight was less in PIH group as compared to control group. This is similar finding to that of Udainia and Jain *et al.* and Majumdar *et al.* study.^{12,13} In our study, low placental weight were associated with low weight babies and also with intrauterine fetal death because of decreased uteroplacental blood flow in PIH.

The mean placental volume less in PIH as compare to control group which was similar finding to that of Aherne and Dunnill *et al.* study.¹⁴ This finding is because of placental insufficiency and so affected growth.

The mean placental diameter was less in PIH group as compare to control group which was similar finding to that of Rath *et al.*¹⁵

CONCLUSION AND SUMMARY

Primigravida females were among most commonly affected group.

Uteroplacental vascular thrombosis leading placental ischemic change and accelerated placental maturation leads to most of the gross changes placenta PIH. Hence, affected uteroplacental blood flow leads to adverse outcome in mother as well as fetus.

Hence, adverse outcome in hypertensive pregnancy can be improved if proper antenatal care, proper health facility, regular follow-up provided along with health education.

These studies conclude that fetus, placenta, and PIH interlinked and this study provides useful adjunct in planning and management of future pregnancy in hypertensive women.

We can come to the interference that such type of study on placenta is strongly indicated in PIH mother for preventing adverse outcome of fetus.

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Goswami and Shah: Gross Study of Placenta in PIH Mothers

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