

A STUDY OF PLACENTAL WEIGHT AND FETAL OUTCOME IN DIFFERENT GRADES OF PREGNANCY INDUCED HYPERTENSION

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ABSTRACT

Introduction and Objectives: Placenta is a feto-maternal organ which is vital for maintaining pregnancy and promoting normal development of the fetus. The weight of the placenta is functionally significant because it is related to villous surface area and to fetal metabolism. Present study has done to record the placental weight and co-relate with the corresponding fetal weight.

Materials and Methods: A total of 100 placentae were studied, out of which 50 placentae belong to pregnancy induced hypertension and 50 placentae were of normotensive pregnant mothers. The weight of placenta and weight of fetus were compared between normotensive (Control) and hypertensive mothers (Cases).

Results: The mean weight of placenta in study group was low as compared to that in the control group. The birth weight of newborn was low with increasing grades of hypertension compared to control groups. The fetoplacental weight ratio was higher in case of mild and severe preeclampsia. The incidence of stillbirth was 0.5%, 12.5% and 20% in mild pre-eclampsia, severe preeclampsia and eclampsia respectively.

Conclusion: In present study, the birth weight was low with increasing grades of hypertension compared to control groups. The fetal: placental weight ratio was higher in case of mild and severe preeclampsia. The incidence of eclampsia was more common in primigravida where as mild preeclampsia was more common in multigravida. The mean weight of placenta in study group was low compared to control group. Thus study of placental changes in pregnancy induced hypertension may help us to understand patho-physiological mechanisms and design treatment plans for better maternal and foetal outcome. Modern sophisticated techniques like ultrasonography have made it possible to study the necessary placental parameters in utero. This helps in assessing the foetal outcome and management.

KEYWORDS: Feto-Placental weight ratio, Pre-Eclampsia.

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INTRODUCTION

Placenta is a feto-maternal organ which is vital for maintaining pregnancy and promoting normal development of the fetus. The placenta is said to be a diary of intrauterine life. The weight of the placenta is "functionally significant" because it is related to villous surface area and to fetal metabolism[1]. Appropriate growth and development of the placenta is essential for fetal growth and wellbeing, and is an important

factor in determining the health in adulthood [2]. Pregnancy complications such as hypertension or gestational diabetes invariably cause structural changes to the placenta. It has been recorded that the maternal utero-placental blood flow is decreased in pre-eclampsia because there is maternal vasospasm[3]. The examination of placenta in utero as well as postpartum provides much insight into the prenatal health of the baby

and the mother[4]. The present study was done to record the placental weight and co-relate with the corresponding fetal weight.

MATERIALS AND METHODS

The present study was done on placentae collected from labor room and operating theatre of the department of Obstetrics & Gynecology. The mothers were examined clinically (for height, weight, blood pressure, pulse etc.) along with recording of their medical history (history of past illness, history of previous child birth etc). Their investigation reports were noted (hemoglobin, blood sugar, blood group, urea, creatinine, urine for albumin and pus cells). The placenta with cord and membranes were collected and observed immediately after the delivery. Any abnormality of the umbilical cord and membrane was noted. In all the cases, the amnion and chorion were trimmed from the placenta. The umbilical cord was cut at a distance of 10 centimeters from the site of insertion. Placentae were washed in slow running tap water, dried with the help of blotting paper. The maternal surface was inspected for the number of cotyledons, presence of infarction and calcification. The placentae along with the umbilical cord were given code numbers and were preserved in 10% formalin solution. The placentae were weighed with a standard weighing machine. The fetal weight was noted from the case records provided.

100 placentae formed the sample size, constituting 50% as control (group I), 29% as mild preeclampsia (group II), 16% as severe preeclampsia (group III) and 5% as eclampsia (group IV). In PIH, only those cases having blood pressure 140/ 90mm of Hg and above, with or without oedema, with or without proteinuria were included. These mothers were normotensive before pregnancy. In the control group, the mothers with normal blood pressure without oedema or proteinuria were included. The subjects were divided into four groups- Group I 50% (normotensive), Group II 29% (mild PIH), Group III 16% (severe PIH) and Group IV 5 % (Eclampsia)).

Patients having diastolic blood pressure more than 90 & less than 100mm of Hg, proteinuria (Traces to 1+) with minimal liver enzyme elevation were included in Group II. Patients having a diastolic pressure of 110 mm of Hg or more, proteinuria (2+ or more), visual disturbances, headache, oliguria, elevated serum creatinine, hyperbilirubinemia, thrombocytopenia, marked elevation of liver enzymes with pulmonary edema were included in Group III. Group IV patients had most of the features of Group III with convulsions. The weight of placenta and weight of fetus were compared between normotensive (Control-Group I) and hypertensive mothers (Cases-Group II, III, IV). The data were statistically analyzed in SPSS 11. The student t-test was used to compare the mean values of placental and fetal weight among case and controls. The Anova test was used to see the differences between various groups among cases. The chi - square test was used for discrete variables.

OBSERVATIONS

Out of the 50 normotensive subjects, 48% constituted primigravida and 52% constituted multigravida. 56% of the subjects were in the age group 26-35 years. Among mild PIH cases 58.6% were primigravida and only 41.48% were multigravida. Whereas in severe PIH the distributions were 50% each. In cases of eclampsia most of the cases belonged primigravida, that is 80 %.

The placental weight in about 44% of normotensive group was ranging between 501-600 grams and 26% were above 600grams. In mild PIH and severe PIH the weight distribution were 34.5% and 43.8% respectively in the range 301-400 grams. None of the placentae were above 600 grams of weight. In severe PIH only 20% of the placentae were of the weight ranging between 300-500 grams. There is a statistically significant difference between the groups among the weights of placentae.

The fetal weights in normotensive subjects were ranging between 2501-3000 grams in 48% and above 3000 grams in 36%. In mild PIH the fetal weights were ranging between 2001-2500 grams

in 41.4% and 2501-3000 grams in 41.4% of the cases. In severe PIH the fetal weights were ranging between 2001-2500 in 80% of the cases and in one case it was 1350 grams. None of them were above 3500 grams in cases. There is a significant difference between the groups among the fetal weights.

The mean placental weight and birth weight in normotensive subjects were 4884 grams and 3015 grams. They decrease with increasing severity of hypertension. The feto-placental weight ratio is higher in case of mild and severe PIH. Though the feto-placental weight ratio is significant between the cases and control, among the cases it is not significant.

On comparison between cases and control there was no statistical significant result found in fetal outcome and incidence of still births.

Table 1: Fetal and placental weight ratio in the present study.

Group	No of cases	Fetal weight (mean) kg	Placental weight (mean) g	F:P ratio
I	50	3.015	488.42	6.17:1
II	29	2.546	406.69	6.26:1
III	16	2.675	374.68	7.13:1
IV	5	2.1	390.33	5.38:1

DISCUSSION

50 cases which belonged to PIH were again grouped as 29 cases of mild PIH (group II), 16 cases of severe PIH (group III) and 5 cases of Eclampsia (group IV). 44% of normal, 58.6% of mild PIH, 43.8% of severe PIH and 56.2% of eclampsia were in the age group of 18-25 years. This is in accordance with studies of Maqueo M, who observed the increased incidence of toxemia with the age range of 16-25 years.

In present study, the incidence of eclampsia in primigravida was high (80%). 58.6% cases of mild PIH belonged to primigravida and 50% of cases of severe PIH belonged to severe PIH. This is in concordance with study done by Maqueo M et al, who observed that incidence of eclampsia are more common in primigravida [5]. Andesh B et al, observed that prim parity was almost twice as common in pregnancy induced hypertension groups when compared with the randomly selected controls [6]. (Table.2)

Table 2: Comparison of parity wise distribution of cases between present and previous studies.

Study	Grade	Primigravida	Multigravida
Maqueo M [5]	Mild PIH	20%	71%
	Severe PIH	25%	60%
	Eclampsia	44%	47%
Present study	Mild PIH	58.60%	41.40%
	Severe PIH	50%	50%
	Eclampsia	80%	20%

In the present study, weight of the placenta in the increasing grades of hypertension was weighing less as compared to that of the control. This is in accordance with Das B et al, who observed that placental weight was significantly reduced where the duration of hypertensive disorders were prolonged. Although the still births were not significantly increased in this study [7], Udania A et al observed that there was a significant lowering of placental weight in pregnancy induced hypertension. A significant increase in the incidence of IUGR and still births is found with lower placental weight. (Table 3 and 4). LBW was associated with low placental weight [8]. In placentae weighing less than 300gms fetal birth weight was low and associated with fetal asphyxia. Significantly correlates with the severity of pregnancy induced hypertension.

Table 3: Comparison of mean weight of placenta between present and previous studies.

Study	Weight(gm)	I	II	III	IV
Das B et al. [7]	<300	-	5%	40%	55%
	301-400	15%	25%	35%	30%
	401-500	65%	60%	20%	15%
	>500	20%	10%	5%	-
Pasricha Navbir [12]	≤ 400	36.67%	50%	60%	83.33%
	400-600	60%	50%	40%	16.67%
	>600	3.33%	-	-	-
Present study	<300	-	13.80%	6.20%	-
	301-400	4%	34.50%	43.80%	20%
	401-500	26%	24.10%	31.20%	20%
	>500	66%	27.60%	18.80%	8%

Table 4: Comparison of fetal weight between present and previous study.

Study	Fetal weight (Kg)	I	II	III	IV
Dutta KD et al[8]	<2.5	6.25%	13.30%	-	22.73%
	>2.5	95.75%	86.70%	100%	77.78%
Present study	<2.5	8%	94.80%	25%	20%
	>2.5	92%	55.20%	75%	80%

In present study, the fetal weight was reducing with increasing grades of hypertension, with 80% are <2.5Kg in eclampsia. Dutta KD et al, observed that babies weighing less than 2.5 Kg were seen in 22.73% cases of eclampsia, 13.3% in mild eclampsia and 6.25% in control groups [8]. (Table.3)

In the present study, the mean birth weight and mean placental weight were low with increasing grades of hypertension compared to controls. This study is in accordance with the study of Das B et al [7] and Mohan H et al. [10] (Table.5)

Table 5: Comparison of the mean fetal & placental weight between present and previous studies.

Study	Groups	No of cases	Mean birth wt	Mean placental wt
Mohan H et al[10]	I	20	2.8	476.25
	II	10	2.86	477
	III	20	2.3	440
	IV	4	1.6	318.7
Das B et al[7]	Normal	20	2.9	442
	Mild PIH	20	2.6	422.5
	Severe PIH	20	2.05	377.5
	Eclampsia	20	1.84	355
Sumit Gupta[13]	Control	100	2.587	481.5
	Mild PIH	70	2.379	415.71
	Severe PIH	30	2.03	365
Present Study	I	50	3.015	488.42
	II	29	2.546	406.69
	III	16	2.675	374.68
	IV	5	2.1	390

In the present study, the fetal: placental weight ratio was higher in case of mild and severe preeclampsia. Whereas the studies done by Mohan H et al and Das B et al showed a progressive decrease in fetal: placental weight ratio with increasing grades of hypertension. These findings are not in accordance with the findings of Mohan H et al and Dar B et al study. (Table.6)

Table 6: Comparison of feto- placental weight ratio between present and previous studies.

Group	Mohan H et al[10]	Das B et al[7]	Present study
I	6.08:1	6.56:1	6.17:1
II	6.00:1	6.15:1	6.26:1
III	5.28:1	5.43:1	7.13:1
IV	5.18:1	5.21:1	5.38:1

Fox (1964) reported, hypertrophy of placental mass in response to chronic hypoxia on hypertensive patients. This hypertrophy along with LBW contributes to low fetal placental weight ratio [11].

In present study, the incidence of still births was 0.5%, 12.5% and 20% in mild preeclampsia, severe preeclampsia and eclampsia respectively.

These findings correlate with the study of Maqueo M et al, the incidence of still births in cases of severe preeclampsia and eclampsia were 18% and 22% respectively [5]. In the comparative study of Mohan H et al (1989) fifty percent of eclampsia patients delivered still born babies [10].

CONCLUSION

Distribution of age in the 18-25 year bracket for various groups was as follows control 44%, mild preeclampsia 58.6%, severe preeclampsia 43.8% and eclampsia 40%. The incidence of eclampsia was more common in primigravida where as mild preeclampsia was more common in multi-gravida. The mean weight of placenta in study group was low compared to control group. In present study, the birth weight was low with increasing grades of hypertension compared to control groups. The feato placental weight ratio was higher in case of mild and severe preeclampsia. The incidence of stillbirth was 0.5%, 12.5% and 20% in mild pre-ecampsia, severe preeclampsia and eclampsia respectively. Thus study of placental changes in pregnancy induced hypertension may help us to understand pathophysiological mechanisms and design treatment plans for better maternal and foetal outcome. Modern sophisticated techniques like ultrasonography have made it possible to study the necessary placental parameters in utero. This helps in assessing the foetal outcome and management.

Conflicts of Interests: None

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