CORRELATION OF PLACENTAL PARAMETERS IN PREECLAMPSIA AS A PREDICTOR OF IUGR/LOW BIRTH WEIGHT IN INFANTS A PROSPECTIVE STUDY

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ABSTRACT: AIMS AND OBJECTIVES: The incidence of IUGR is around 10-15%. Studies have shown that diminished placental size precedes fetal growth restriction. The present study is aimed at assessing placental diameter and thickness by ultrasound and estimating placental volume at 36 weeks of gestation to predict IUGR/low birth weight in patients with pre-eclampsia. **MATERIALS AND METHODS:** 100 women at 36 weeks of gestation were studied. 50 belonged to study group (pre-eclampsia) and 50 belonged to control group i.e. normal antenatal cases. The placental parameters as diameter, thickness and volume were measured ultrasonographically at 36 weeks of gestation in both the groups. These parameters at 36 weeks were correlated with birth weight and actual placental parameters at delivery. **RESULTS:** The mean age and parity in both study and control groups was comparable. The mean placental diameter measured at 36 weeks of gestation was 14.5cms in study group and 18.2cms in the control group which was statistically significant ($p=0.0015$). The mean placental thickness in study group was 2.09cms and control group it was 3.44cms which was statistically significant ($p=0.0032$). The mean placental volume in study group was 482.30cc and 1159.70cc in control group which was also statistically significant ($p=0.0005$). The number of low birth weight babies ($<2.5\text{kg}$) in study group was 41(82%) and that in control group was 17(34%) and was statistically significant ($p<0.001$). Univariate analysis and logistic regression analysis suggested that placental diameter and thickness were the predictors for low birth weight. **CONCLUSION:** Placental parameters i.e. diameter, thickness, and volume measured ultrasonographically at 36 weeks of gestation were significantly less in patients with pre-eclampsia in whom low birth weight babies are significantly more than in control group. Ultrasonographically measured placental diameter and thickness measurement appears to be of prognostic value in identifying the subsequent occurrence of low birth weight.

KEYWORDS: Placenta, Birth Weight, IUGR, Placental diameter, Placental thickness, Placental volume, preeclampsia, PIH.

INTRODUCTION: The incidence of intrauterine growth restriction is around 10-15%.^[1] IUGR is the leading cause of perinatal morbidity and mortality. Asymmetric IUGR is considered to reflect placental dysfunction.

Despite careful antenatal surveillance a majority of IUGR infants are not diagnosed until delivery. These IUGR babies are susceptible to hypoxia, fetal distress, long term handicap and fetal death. If we can predict IUGR in antenatal period, we can provide better care to mother and baby.

The placenta is a fetal organ with metabolic, endocrine, and immunologic functions besides being responsible for nutrition, respiration and excretion for the fetus. Lastly acting as a barrier it has a role in protecting the fetus from noxious agents.

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Several sonographically derived fetal parameters are used to estimate fetal weight like BPD, HC, AC and FL.

The present study is aimed at assessing placental diameter, thickness by ultrasound and estimate placental volume at 36 weeks of gestation to predict IUGR/low birth weight babies.

AIMS AND OBJECTIVES: The study was designed with an aim to:

1. Correlate placental diameter, thickness and volume at 36 weeks of gestation with birth weight in patients with pre-eclampsia.
2. Compare placental parameters with birth weight in normal pregnant women and in patients with preeclampsia.

MATERIALS AND METHODS: It was a prospective study conducted at the institute from June 2008 to July 2009. All pregnant women attending the outpatient clinic meeting the below inclusion criteria were enrolled. Ethical clearance from institutional ethical committee was taken.

Inclusion Criteria: The inclusion criteria were:

1. Pregnant ladies with singleton pregnancies with pre-eclampsia at 36 weeks of gestation who were sure of dates were included in study group.
2. Same number of normal antenatal cases were recruited as control, having same age, parity and gestational age who were sure of dates.

Preeclampsia was diagnosed when:

1. Blood pressure was $\geq 140/90$.
2. Proteinuria ≥ 300 mg/24 hour or $\geq 1+$ by dipstick method.

Exclusion Criteria: Following patients were excluded:

1. Multiple gestation.
2. Medical disorders in pregnancy like diabetes mellitus, cardiac disorders, renal diseases, epilepsy, and hemoglobinopathies.
3. Obstetric confounding factors like bad obstetric history, congenital anomalies of fetus.
4. Posteriorly located placenta.
5. Those not consenting to participate.

The following Parameters were recorded for Correlation:

Antenatal:

1. Placental diameter thickness and volume.
2. Fetal weight biparietal diameter, head circumference, abdominal circumference and femoral length.

Postnatal:

1. Mode of delivery.
2. Placental weight, diameter, thickness and volume.
3. Fetal weight and sex.

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Placental diameter was measured using length of chorionic surface in transverse direction. Thickness was measured at the level of umbilical cord insertion.

Post-partum placental weight was calculated by stripping the membranes and leaving an umbilical stump of 2 centimetres.

Abnormal outcome of pregnancy was defined as birth weight below tenth percentile of Kloosterman's chart or birth weight less than 2500 grams.

A total of 162 patients were enrolled in study. 32 were however excluded due to a posteriorly placed placenta.

Statistical correlation was done using chi square test.

RESULTS: The mean age in the study group was 24.16 ± 4 years and in control group it was 25 ± 3.35 years. This difference was not statistically significant (Fig. 1). In study group 28(56%) and 25 (50%) in control group were primi gravidae. Sixteen (32%) patients in study group and 20(40%) patients in control group were second para. Six (12%) patients in study group and 5(10%) were with parity >2. This difference in parity was not statistically significant (Fig. 2). Hence using univariate analysis these differences were not found to be statistically significant and were comparable.

The mean placental diameter (Table 1) measured at 36 weeks of gestation was 14.5cms in study group and 18.2cms in the control group. This difference was statistically significant ($p=0.0015$) (Fig. 3).

The mean placental thickness (Table 2) in study group was 2.09cms and control group it was 3.44cms. This difference was statistically significant ($p=0.0032$) (Fig. 4).

The mean placental volume (Table 3) in study group was 482.30cc and 1159.70cc in control group. This difference was also statistically significant ($p=0.0005$). The number of low birth weight babies (birth weight <2.5kg) in study group was 41(82%) and that in control group was 17(34%).

This difference was statistically significant ($p<0.001$). (Fig. 5)

The two groups were compared for mode of delivery. The difference was not statistically significant. After delivery the placental parameters were measured and they were correlated with ultrasonographically measured parameters. Univariate analysis suggested that age and parity were not significant. The logistic regression analysis suggested that placental diameter and thickness were the predictors for low birth weight (Fig. 6).

DISCUSSION: Normal placental function and structure is a necessary factor for the formation of healthy fetus and consequently normal birth weight. Early detection of any pathology in the placental bed and villi helps obstetrician to consider prenatal care precisely.

In our study we found a significant correlation between placental diameter, volume, thickness and birth weight. The mean placental diameter (Table 1) measured at 36 weeks of gestation in was 14.5cms in study group and 18.2cms in the control group. This difference was statistically significant ($p=0.0015$). Placental the thickness in study group was 2.09cms and control group it was 3.44cms.

This difference was statistically significant ($p=0.0032$). The mean placental volume (Table 3) in study group was 482.30cc and 1159.70cc in control group. This difference was also statistically significant ($p=0.0005$). This difference was statistically significant. All the above correlated with fact that there were a significant number of low birth weight babies in the study group as compared to normal control group ($p<0.001$).

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Fawzia A Habib^[2] et al observed that placental diameter of less than 18cms and a placental thickness of less than 2cms at 36 weeks of gestation could be highly sensitive cut off points for detecting low birth weight infants. They concluded that ultrasonographic placental diameter and thickness measurement appears to be of prognostic value in identifying the subsequent occurrence of fetal growth retardation.

In a study conducted by Hans wolf et al,^[3] the estimated placental volume and weight by ultrasonographic measurement at regular intervals of 2-4 weeks from 16-20 weeks of gestation. They concluded that reduced placental volume growth precedes fetal complications and growth retardation. Studies have shown that diminished placental size precedes fetal growth restriction.^[4]

In a study conducted by Dudley et al^[5] placental grade and thickness were retrospectively analyzed for association with low birth weight and gestational age at delivery. They concluded that placental grade and thickness appear to offer complementary information, grade being more strongly associated with duration of pregnancy and thickness being more strongly associated birth weight for gestational age.

CONCLUSION: Placental parameters i.e. diameter, thickness, and volume measured ultrasonographically at 36 weeks of gestation are significantly less in patients with pre-eclampsia in whom low birth weight babies are significantly more than in control group.

Ultrasonographically measured placental diameter and thickness measurement appears to be of prognostic value in identifying the subsequent occurrence of low birth weight.

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Birth Weight	Cases		Control	
	<2.5kg	>2.5kg	<2.5kg	>2.5kg
Mean placental diameter (in cms)	14.23	15.78	17.4	18.61
SD	1.35	0.44	1.25	1.34
Number	41	9	17	33
Percentage	82	18	34	66
p value	0.0015		0.0033	
Table 1				

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Birth Weight	Cases		Control	
	<2.5kg	>2.5kg	<2.5kg	>2.5kg
Mean placental thickness (in cms)	2.07	2.18	2.93	3.50
SD	0.28	0.22	0.35	0.48
Number	41	9	17	33
Percentage	82	18	34	66
p value	0.0032		<0.001	

Table 2

Birth Weight	Cases		Control	
	<2.5kg	>2.5kg	<2.5kg	>2.5kg
Mean placental volume (in cc)	451.38	623.15	928.62	1278.75
SD	132.54	70.18	136.15	26.34
Number	41	9	17	33
Percentage	82	18	34	66
p value	0.0005		< 0.001	

Table 3

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