Original Research Paper

Obstetrics and Gynecology

STUDY OF CORRELATION OF PLACENTAL WEIGHT WITH BIRTH WEIGHT OF FETUS IN NORMAL DELIVERY

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ABSTRACT **Objectives:** To measure placental weight and birth weight in normal pregnancies and to determine whether there is any association between abnormal placental weight and its ratio with adverse pregnancy outcomes. **Design :** Descriptive observational study. Material and method: From 1st Sept 2020 to Sept 30th 2021, placentae were obtained from 300 normal pregnancies, between 37-40 gestational weeks. The placentas weights were recorded. Pearson chi square test was used to analyze the data. A p value < 0.05 was considered significant. Results: In our study 45.7 % were in age group of 21-25 followed by 22.3 % in 15 -20 years 65.7% were multiparous and 34.3 were primiparous . Mean placenta weight was 529.8 g with SD of 93.49.Mean birth weight in our study was 2.91 kg with SD of 0.4 kg. **Conclusion:** Our study proves that there is a strong relationship between the placenta and the fetus suggesting that the wellbeing of the fetus is highly dependent on the placenta since it serves as a link between the mother and the developing fetus.

KEYWORDS : placental weight, Birth weight, Pregnancy outcomes

INTRODUCTION:

Birth weight is the first weight of your baby, taken just after he or she is born. A low birth weight is less than 5.5 pounds. A high birth weight is more than 8.8 pounds. A low birth weight baby can be born too small, too early (premature), or both. This can happen for many different reasons. They include health problems in the mother, genetic factors, problems with the placenta, and drug use by the mother [1]

Indeed, the birth weight (BW)/placental weight (PW) ratio has been associated with perinatal mortality and morbidity and with mortality for cardiovascular disease in adult life [2,3].The placenta is a complex multifunctional organ of mainly fetal origin with pleiotropic roles during fetal growth. It has a portion derived from the developing embryo and a maternal portion formed by the modification of the uterine lining of the mother [4]. Several studies have been conducted in the developed countries and Asia which have suggested that placenta indices have a significant role in fetal growth in terms of weight, body length, and cord length [8]

Our aim was to find/ evaluate the average weight of placenta and fetus in our area, to find placental weight /birth weight ratio in normal singleton pregnancies from 37-40 weeks and to evaluate whether there is an association of abnormal placental weight and its ratio with adverse birth weight.

Objectives:

1. To measure placental weight and its ratio to birth weight in normal pregnancies.
2. To determine whether there is any association of abnormal placental weight and its ratio to birth adverse pregnancy outcomes.

Materials and methods

Placentae were obtained from 300 pregnant women who delivered at JIIU'S IIMSR, Jalna between 1st Sept 2020 to 30th Sept 2021 . Those subjects were included who delivered between 37-40 weeks of gestation. In some cases, first trimester ultrasound was used for dating the pregnancy and confirming the gestational age. The presented subjects' fetuses were deemed appropriate for gestational age (AGA).The mean gestational age at delivery was 38.8 weeks .

Inclusion criteria

Normal pregnancies who delivered between 1st sept 2020 to 30th sept 2021 at JIIU'S IIMSR, Jalna between the gestational age of 37-40 weeks.

Exclusion criteria

1. Maternal diseases affecting placental weight like diabetes, hypertension, anemia and other medical problems.
2. Multifetal gestation and
3. Congenital anomalies in baby.
4. Retained placenta and morbidly adherent placenta.

Placenta preparation

Placenta were prepared according to method of placental preparation described by Molteni et al [1], in the following manner. The placentae were trimmed off all membranes and the umbilical cord was cut at the insertion site on the placental surface. All the superficial fetal vessels were drained of all blood. Adherent clots were removed. The placentae were weighed three times on a calibrated digital device to the nearest gram and the means were calculated . the weights were recorded within one hour of delivery.

Newborn protocol

The newborns' weight were recorded immediately after delivery. The weight was recorded to the nearest gram. Only newborns that weighed in the AGA group were included. APGAR scores were recorded at 1 and 5 minutes after birth. Any other relevant complication was noted within 48hrs after birth which required NICU (Newborn Intensive Care Unit).

Statistical methods

The sample size was estimated and standard deviation of placental weight for each gestational age was calculated. Placental weight ratio (PWR) was defined was defined as ratio of placental weight to newborn birth weight multiplied by 100 (%). Placental weight and PWR were described as median , the 10th and 90th percentiles for each gestational age group. The Pearson product moment correlation coefficient was used to test the magnitude and significance of any relation between placental weight and birth weight. Fisher's exact test was used to compare abnormal placental weight and abnormal PWR with adverse outcomes of the newborn for the intrapartum and perinatal periods. P values of < 0.05 were considered statistically significant.

Table -1 : Demographic characteristics of the study population

Sr NO	Age Categories	Frequency	Percentage
1	15-20	67	22.3%
2	21-25	137	45.7%
3	26-30	84	28%
4	31-35	12	04%

5	>35	0	0%
	Total	300	100%

Table 2: Parity and gestational age

Parity	Frequency	Percentage
Primipara	104	34.3
Multiparous	196	65.7
	300	
Gestational Age		
<37	68	22.7
38	107	35.7
39	50	16.7
40 and above	75	25

Table 3: Mean and Standard deviations of Birth weight and placental weight

	Mean	N	Std. Deviation	Std. Error Mean
Birth Weight	2.9024	300	.41127	.02374
Placental weight	529.32	300	93.483	5.397

Table 4: Pearson's correlation of birth weight and placental weight

Correlations				
			Placental weight(gm))	Birth Weight(Kg)
Placental weight(gm)	Pearson Correlation		1	.668
	Sig. (2-tailed)			.001
	N		300	300
Birth Weight(Kg)	Pearson Correlation		.668	1
	Sig. (2-tailed)		.001	

Fig 1: Scatter plot of correlation between Placental weight and birth weight
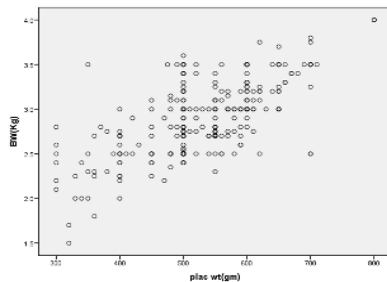
Table 5: Placental weight to birth weight ration

Placental weight to Birth Weight ration			
	Statistic	Bootstrapa	
		95% Confidence Interval	
		Lower	Upper
N	300	300	300
		0	0
Mean	.1830	.1801	.1856
Std. Deviation	.02479	.02225	.02735
Range	.18		

Results and discussion:

In our study 45.7 % were in age group of 21-25 followed by 22.3 % in 15 -20 years and very few above 30 years age group and no significant difference was noted between age at pregnancy and placental weight As far as parity is considered 65.7% were multiparous and 34.3 were primiparous.22.7% were delivered before 37 weeks of gestation.35.7% at 38 weeks, 16.7% at 39 weeks and 25% after 40 weeks of gestation.

The weight of the placenta gives an idea of the amount of substance that is exchanged between the mother and the fetus. The mean placenta weight was 529.8 g with SD of 93.49.Mean birth weight in our study was 2.91 kg with SD of 0.4 kg. The weight of the placenta was found to have a significant positive correlation with the weight of the baby (r = 0.668, p<0.001 mean obtained in the present study. In a study by LH Sanin et al the mean of birth weight was 3,369 g with a standard deviation (SD) of 445 g[5]. Placenta weight had a mean of 537 g (SD: 96 g). This indicates that the mean placenta weight differs from place to place and may be due to so many factors such as nutrition, genetics, gestational age, maternal size, etc .it then implies that, factors which directly affect the weight of the baby will indirectly affect the weight of the placenta. Such factors could include nutrition, maternal size, maternal hemoglobin gain, altitude, paternal factors, maternal and paternal genetics, gestational age, maternal diabetes mellitus, etc .In our study there was positive pearson's correlation between birth weight and placental weight with significance level of 0.01 and pearson value of 0.668. In a study by Sanin et al The relation between the weight of the placenta and the birth weight was significant, and we found that for each gram increase in placenta weight, birth weight is increased by 1.98 g (SE = 0.25, p < 0.01) and this relation is not linear, since the quadratic term is significant. Placenta weight has a nonlinear relation to the birth weight and is an important predictor of birth weight [5].in a similar study by fulvia Glori Bottini in veitnam The correlation between Birth Weight and Placental weight and the value of r^2 are particularly lower in puerperae with preexisting diabetes as compared to healthy puerperal, pointing to a dissociation between the two parameters. Since the weight of the placenta correlated positively with the fetal weight , it then implies that, factors which directly affect the weight of the baby will indirectly affect the weight of the placenta. Such factors could include nutrition, maternal size, maternal haemoglobin gain, altitude, paternal factors, maternal and paternal genetics, gestational age, maternal diabetes mellitus, etc. According to (Van den Broek et al., 2005), unfixed placentae that weigh more than 600g are pathologic, but more important may be the placenta/fetal ratio. Chronic low uteroplacental blood flow is the most frequent cause of small placentae, but often the fetal weight is affected, so the ratio may be normal

Conclusion:

Our study proves that there is a strong relationship between the placenta and the fetus suggesting that the wellbeing of the fetus is highly dependent on the placenta since it serves as a link between the mother and the developing fetus for nutritional support, excretory functions as well as immunological and hormonal support. The best indicator of fetal weight is placental weight. Critical examination of the placenta and umbilical cord immediately after delivery should be used to determine the wellbeing of the baby. It is our belief that the PW/BW ratio may serve as an easy clinical marker for short-term adverse obstetric outcomes and the calculation of PW/BW ratio is simple and easy and can be practiced at primary health centres.

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