Journal of Muhammad Medical College
Website: jmmc.mmc.edu.pk

Original Article

To evaluate the outcome of maternal factors affecting placental birth weight ratio.

Uzma Aslam[1,*], Raishem[2], Asma Aslam[3], Naila Yousuf[4], Farkhana Yasmeen[5], Aneela Aijaz[6].

1: Registrar Gynae unit 1; Peoples University of Medical and Health Sciences For Women. Nawabshah.

2: Assistant professor Gynae unit 1;PUMHS. Nawabshah.

3: Women medical officer at General Dispensary; Nawabshah.

4: Associate professor Gynae unit 2; PUMHS; Nawabshah.

5: Assistant professor Gynae unit 1;PUMHS; Nawabshah.

6: Gumbat institute of medical science and liver transplant

***=corresponding author**
druzmazahid8@gmail.com

Abstract:

Introduction: Placental birth weight ratio (PBWR) is of significance to determine fetal growth, nutrition, prenatal outcome and maternal morbidity and mortality. PBWR differs in accordance with gestation as increasing gestational age decreases placental weight and outcomes of pregnancy are adverse. Higher PBWR enhances the peri-natal mortality and lower ratio causes intrauterine growth retardation (IUGR).

Objectives: To find out the effect of maternal diseases on the placenta and birth weight ratio.

Methodology: This cross-sectional study was conducted between January 2018 to June 2019 at department of Gyn/Obs PMCH Nawabshah. Detailed history was taken including the maternal comorbidities. Age of patients, history of hypertension, smoking and Parity was also asked. Anemia was examined specifically. Relevant examination was done. The effects of maternal factors on placental and birth weight were noted to draw conclusion.

Results: Total 89 patients were included in this study. Of them, 60(67%) were multi parous and 29(33%) were primipara. Age range of study population was 31 to 40 years. Overall, 77.52% patients were up to the age of 30 years. Increased placental to birth ratio of 13.4% was seen due to increased maternal age, 16.8% for multiparity, 19.1% for HTN, smoking 7.8% and maternal anemia 24.7%.

Conclusion: PBWR is higher due to HTN, smoking, increased maternal age, diabetes, and anemia sequentially.

Keywords: Fetal growth, Maternal Morbidity, Placental birth weight ratio.

Introduction:

Placental birth weight ratio (PBWR) is of significance to determine fetal growth, nutrition, prenatal outcome and maternal morbidity and mortality. The mean PBWR of 20.0% and 19.5% reported in western Europe and Asia. PBWR differs in accordance with gestation as increasing gestational age decreases placental weight and outcomes of pregnancy are adverse. Higher PBWR enhances the peri-natal mortality and lower ratio causes intrauterine growth retardation (IUGR).[1]

Maternal factors affecting PBWR are age, parity, diabetes, gestational age, pre-eclampsia, smoking and anemia. Many studies have shown the low birth weight due to maternal morbidity. Increasing neonatal morbidity and mortality due to low-birth-weight account for 60% of 4 million deaths worldwide.[2] It is found out that hypertension among mothers usually affect the growth of both the placenta and the fetus as well. Placental morphometry shows 67% of variations in birth weight. Chronic hypertension and pre-eclampsia have

strongest association with high placental birth weight ratio.[3]

Anemia is commonly seen in pregnant patients and this affects the weight of fetus. Anemic mothers mostly have low birth weight offspring. In these patients increased placental size is noted in some studies. The best example in this connection is the big bulky placenta found associated with fetal hemoglobin Bart's disease. However, increased placental ratio is observed in pregnancies with anemic mothers. This could be due to iron deficiency anemia. This placental ratio can also be found in patients with thalassemia trait.[4,5]

Gestational diabetes is usually due to production of placental hormones causing insulin resistance and consequently increase occurs in placental size concomitant with fetal size.[6] Cigarette smoking by pregnant women can highly increase the risk of abortion, ectopic pregnancy and decrease in growth of fetus. Regarding parity, the general consensus is that the outcome of pregnancy is better in multipara as compared to primiparae.[7] Grand multipara has increased risk as they have different adverse factors influencing the PBWR like race, socioeconomic status, smoking, use of alcohol and genital infection. Increased placental ratio is found to be associated with smoking and residence at high altitudes.[8,9]

Objective:

To find out the effect of maternal diseases on the placenta and birth weight ratio.

Methodology:

This cross-sectional study was conducted at department of Gyn/Obs PMCH Nawabshah during from January 2018 to June 2019. This is tertiary care hospital of 1100 beds located in Shaheed Benazir Abad District, Sind Province. Catchment area includes patients not only from Sind but also from Baluchistan. Total 89 patients who met the criteria were included in this study.

All the patients participated in this study were admitted from Gyn/Obs OPD and emergency department of PMC Hospital Nawabshah. Detailed history was taken including the maternal co-morbidities. The characteristic noted includes age, anemia, history of hypertension, smoking and parity were noted. Relevant examination was done. Apart from biochemical investigations, radiological status was also seen in patients to see the condition of fetus and all other required information was collected. The effects of maternal factors on placental and birth weight were noted in results and conclusion was drawn.

Results:

Total 89 patients were included in this study. Of them, 60(67%) were multi parous and 29(33%) were primipara. Among all 27 (30.33%) patients were aged 18-23 years, 42(47.19%) patients between 24-30 years and 20 (22.48%) patients were between 31 to 40 years. Average age was 30 years.

Table No 1: Age Groups

S.No	Age group	No of patients	%
1	18-23	27	30.33%
2	24-30	42	47.19%
3	31-40	20	22.48%
Total		n=89	100%

Maternal factors caused increased PBWR in our study. High ratio of 13.4% was seen due to increased maternal age, 16.8% for multiparity, 19.1% for HTN, smoking 7.8% and maternal anemia 24.7%.

Table No: 2 Maternal factors leading to high PBWR

Maternal Factor	High PBWR	
	Yes	No
Increased maternal age	12(13.4%)	8(8.9%)
Multiparity	15(16.8%)	45(50.5%)
HTN	17(19.1%)	6(6.7%)
Smoking	7(7.8%)	3(3.3%)
Maternal anemia	22(24.7 %)	8(8.9%)

Discussion:

Placenta is the vital organ for maintaining health of mother and fetus during entire course of pregnancy. It functions to transfer and exchange oxygen and nutrition in order to accomplish needs of fetus.[10] It supports the growth of fetus. The complications of pregnancy are directly related to function of placenta. The birth weight is influenced by placental weight. These both factors are useful markers of fetal nutrition and utero-placental function. Apart from this, maternal diseases and nutrition grossly affects the outcome of placental and birth weight of fetus. The pathophysiology of maternal factors and their impact on fetal growth entails that these influence the placental nutritional transport. The capacity of transport depends upon the total surface area and efficacy of transporters. The changes in PBWR can occur due to involvement of developments in maternal well-being.[11,12]

In a study, it was concluded that maternal anemia is associated high PBWR. In our study, high PBW ratio was seen in anemic patients that is 24.7%. In a study done on 1000 patients with low hemoglobin concentrations, low PBWR was reported. In another study, High PBWR was seen among hypertensive mothers but the study done by Perry et al found no difference between the mean placental weight and preeclampsia and gestational hypertension. In our study, High PBWR was observed to be 19.1%. Bortoluset et al concluded that pregnancy induced HTN result in high weight placentas.[13]

Smoking has not significant effect on placenta but affects the birth weight. In a study, maternal smoking and rate of multiparity was high but was no specific. Regarding maternal age, studies have shown that older mothers have babies born with small gestational age. In another study, increase in maternal age resulted in higher placental birth weight ratio.[14] Barker et al reported that higher blood pressures have occurred in men and women who had been small babies with large placentas. Little et al concluded that infant size and placental weight have mutual positive co relation.[15]

The effects of maternal factors and pregnancy complications on PBWR have been minimally studies in the epidemiological literature and needs investigation. The conditions of particular interest are of indicative of ischemic placental disease (IPD). In a study, the pregnancies with Diabetic mothers have higher birth weight as compared to non-diabetic ones. Due to maternal diabetes, length of gestation is shorter as length of gestation is closely related to placental weight. [16,17]

Conclusion:

It is concluded that maternal factors have enormous effect on PBWR. In our study, PBWR was seen to be higher due to HTN, smoking, increased maternal age, DM, and anemia

Financial disclosure statement:

This research did not receive any grant.

Conflict of interest:

The authors declare no conflict of interest.

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