

Placental weight and its relationship with the birth weight of term infants and body mass index of the mothers: A Reviewed Article

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I. INTRODUCTION

Placenta is a vital organ for maintaining pregnancy and promoting normal fetal development. The placenta- 'the life of the fetus in utero'- functions diversely to support the growth of the fetus, interacts with the two individuals, the mother and the developing fetus. It is the most accurate record of the infant's prenatal experiences. Pregnancy complications which are associated with high perinatal morbidity and mortality are reflected in the placenta both macroscopically and microscopically. It has been shown that development of placenta has got influence on birth weight and placental weight.

Overview on Placental weight and its relationship with the birth weight

The high placental weight /birth weight ratio was found to be associated with increased risk in hypertension in adulthood coronary heart disease, cardiovascular mortality and impaired glucose tolerance. Placental weight and newborn birth weight, with an average placental-to-birth-weight ratio of approximately 1:6 to 1:7. Heavier, appropriately sized placentas provide optimal fetal nutrition, strongly indicating healthy fetal growth and development. Fetal growth and the ability to thrive in utero depends upon placental function. The average weight of a trimmed placenta at term is reported to be 510 g, with a diameter of 185 mm, 23 mm thickness, and an average volume of 500 ml. Placental weight has also been reported to vary between 300 g and 890 g. Neonatal birthweight to placental weight ratio indicates the adequacy of fetal nutrition, while the placental weight

to birthweight ratio is a proxy indicator of placental efficiency.

Average Placental Weight:

Typically ranges from 450 to 600 grams depending on maternal health and gestation period.

Average Newborn Birth Weight:

Usually falls between 2.5 kg and 3.5 kg for term deliveries (37 to 42 weeks)

Placental/Birth Weight Ratio (PW/BW):

Normal values generally sit around 15% to 22%. A ratio that is too high (e.g., above 24%) or too low indicates an increased risk of adverse perinatal outcomes, intrauterine growth restriction (IUGR), or intensive care (NICU) admission.

Placental Preparation

Placenta reflects the well-being of the fetus and continuously undergoes a change in weight and function. Placentae were prepared according to the method of placental preparation as described in the following manner. An accurate weighing of the placentas was done by trimming off all membranes and severing the umbilical cord at the insertion site on the placenta surface. Superficial fetal vessels were drained of all blood. Adherent blood clots were removed from the maternal surface. The placenta was weighed three times on a calibrated digital device to the nearest gram. The weights were recorded. The weighing was accomplished within one hour after delivery. The birth weight of newborns was recorded to the nearest gram on electronic weighing machine immediately after delivery.

Maternal BMI and Placental Weight:

Maternal body composition during early pregnancy heavily influences placental development. Underweight mothers are more likely to experience placental growth restriction, leading to lighter placentas and smaller babies. Conversely, overweight and obese mothers are more likely to develop enlarged, heavy placentas, which can occasionally lead to fetal macrosomia (abnormally large babies). Maternal weight status, such as the pregestational body mass index is a predominant determinant of birthweight, a commonly used indicator of fetal growth. The epidemic increase in BMI throughout the last decades has led maternal pregestational overweight ($\text{BMI} \geq 25 < 30 \text{ kg m}^{-2}$) and obesity ($\text{BMI} \geq 30 \text{ kg m}^{-2}$) to become major risk factors for adverse offspring health

II. CONCLUSION

Birth weight of an infant is the single most important determinant of its chances of survival, healthy growth and development.¹ Accurate estimation of fetal birth weight is essential for the management of labor and delivery. The predictability of fetal weighs by clinical assessment and ultrasound is limited and Continuous assessment of fetal weight is a pivotal part of antenatal care, especially during management of high-risk pregnancy such as diabetes. This is essential in the management of labor and delivery². Pre-eclamptic pregnancies significantly reduce placental weight. These changes may be due to placental insufficiencies as a result of compromised uteroplacental blood flow in pre-eclamptic pregnancies.³ Placental pathology is a well-known cause of perinatal and neonatal mortality and morbidity, and may correlate with placental growth, which can be assessed indirectly by anthropometric placental measurement.⁴ Maternal BMI (kg m^{-2}) was calculated from the weight measured at the first antenatal visit using a calibrated scale and the measured maternal height.⁵

RECOMMENDATIONS

Fetal birth weight depends upon maternal BMI as well as Placental weight. Optimizing maternal obesity and dietary factors to optimize placental weight can help in optimizing fetal birth weight. Increased birth weight (macrosomia) where the fetal weight is above

4500 grams is associated with adverse fetal outcome leading to shoulder dystocia ending up in Erb's palsy, humerus or clavicular fractures and birth asphyxia. In short fetal birth weight is associated with adverse obstetrical outcome both in term of maternal and fetal morbidity. Long-term consequences of fetal macrosomia include preponderance to obesity, heart disease and diabetes. Therefore, it is important to investigate the predictors of fetal birth weight so that timely intervention can be taken to address those predictors to prevent the fetal macrosomia.

There are many methods used to predict fetal birth weight including symphysis-fundal height (SFH), clinical, and ultrasonographic methods. The predictive power of all these methods is limited, and in most cases, we used to diagnose macrosomic babies retrospectively. Further studies are important to improve our prediction of fetal weight. The estimation of the placental size and volume using ultrasound has been used to predict fetal birth weight. While several studies were conducted to examine this association, the predictive power remains equivocal and further studies are warranted to investigate this association

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