



Original Article

Estimated Fetal Weight and Placental Thickness in Hypertensive and Non-hypertensive Women Diagnosed on Ultrasound: A Case Control Study

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ABSTRACT

The placenta is responsible for development and growth of fetus. It is evident that healthy fetus requires development of the placenta during pregnancy. Hypertension can have unfavorable impact on placental development affecting fetal weight or placental thickness. **Objective:** To compare estimated fetal weight and placental thickness among hypertensive and non-hypertensive women. **Methods:** It was a case-control study carried out at Private Sector Hospital in Gujrat, Pakistan over a three-month period. The sample size of patients was calculated as 40 in both groups as cases and controls using purposive sampling technique. All hypertensive women in second and third trimesters were included after informed consent. The scan was performed on ultrasound machine (APLIO 300) using a trans-abdominal approach to examine in a supine position. The SPSS software version 20 was used to analyze the data. **Results:** The age of pregnant women ranged between 19 to 44 years with mean age of 28.6 years. The gravidity ranged from 1 to 7 and gestational age between 19 to 38 weeks. The fetal weight in hypertensive pregnancy (1.9 ± 0.6 Kg) and normal pregnancy (2.7 ± 0.45 Kg) was found statistically significant. A hypertensive woman carries a fetus with low weight as compared to non-hypertensive. The placental thickness in hypertensive pregnant women was 4.1 ± 0.7 cm and in normal pregnant women was 3.9 ± 0.8 cm and had no significant difference. **Conclusions:** In conclusion there was significant difference between fetal weights among hypertensive and non-hypertensive pregnancies. A hypertensive woman carries a fetus with low weight as compared to non-hypertensive. There was no association found between placental thicknesses.

INTRODUCTION

The endocrine and secretory organ of the fetus is the placenta, which adheres to the fetus via the umbilical cord and serves as the primary source of nutrients, gaseous exchange, waste elimination and defense throughout pregnancy [1-3]. The placenta is responsible for the successful development and growth of the unborn child [4,5]. It is evident that for a healthy fetus, the appropriate development of the placenta during pregnancy is needed [6,7]. The placenta serves as both a fetal and a maternal organ. The villous chorion is the fetal part of the placenta and the decidua basalis refers to the maternal part. Anchoring villi that are tethered to the decidua basalis hold the two parts together [8]. A typical human placenta at term is discoid in appearance, has a diameter of 185 mm, 25

mm thickness and 0.5 kg in weight and has 15 to 30 cotyledons [9]. The definitive placenta may be seen on ultrasonography at a gestational age of 9 to 10 weeks because of its consistently granulated echogenic appearance [10]. The placenta is attached to the fetus by an umbilical cord that has two arteries and one vein and matures till the termination of the 2nd trimester with an average diameter of 17 mm and 500-600 mm of average length [5,11]. The weight of the fetus is a key indicator of fetal survivability, significant progress, and formation, so it is interrelated to placental morphology [4]. When abnormalities affect the development, maturation, and performance of the placenta, both mother and fetal health are jeopardized [12]. Hypertension affects 5-7% of all

pregnancies, with most instances occurring in first pregnancy [13]. Approximately 18% of total maternal fatalities globally are because of hypertensive diseases [14,15]. Chronic hypertension, gestational hypertension and pre-eclampsia are types of pregnancy hypertension [16]. As the mechanism behind it is not well known, it is a major contributor to maternal and fetal morbidities and mortalities [17]. Although the majority of individuals show no obvious signs of illness, which is crucial to remember because high blood pressure is only among the signs [18]. Chronic hypertension affects 1-2% of pregnant women, whereas gestational hypertension affects 3-6% of pregnancies [19,20]. The risk of pregnancy hypertensive problems advances significantly with age, body mass index (BMI) and is higher if there is a family history [21,22]. From 1990-2019, the worldwide occurrence of hypertensive disorders during pregnancy grew by 10.92%, from 16.30 million to 18.08 million [23]. In Pakistan, the incidence of pregnancy hypertension is 9.3% [24]. The pregnancy-related hypertensive disorder prevalence in Pakistan is 6-8% and three women die every 60 minutes as a result of complications associated with pregnancy and delivery [25]. In Pakistan, the maternal death rate is significantly higher than in many other countries and maternal health indices have demonstrated slight progress in recent decades [26]. Increased resistance to utero-placental circulation occurs in pregnancy-induced hypertension that has an unfavorable impact on placental development, causing placental insufficiency and resulting in unfavorable outcomes like fetal hypoxia, intrauterine growth restriction (IUGR), premature birth and intrauterine fetal demise [26-28]. Because the fetus relies on the placenta for nutrients, oxygenation, growth and progression, pregnancy-induced hypertension also causes pathological alterations in the placenta like inflammation, vascular damage, calcifications, fibrinoid necrosis and infarction, all of which affect placental maturation and expansion, giving rise to placental insufficiency [29,30]. The study was designed to explore the change in fetal weight and the measurement of placental thickness using ultrasound in hypertensive pregnancy. The current study highlighted the effect of hypertensive disorders on fetal weight and compared changes in placenta thickness and fetal weight between hypertensive and normotensive pregnancy.

METHODS

A case control study was carried out at the Radiological Section of a Private Sector Hospital in Gujrat, Pakistan. The study was conducted over a three-month period. The sample size of patients was calculated as 40 in both groups as 40 cases and 40 controls using purposive sampling technique. All hypertensive women in their second and

third trimesters were included in this study. This study excluded diabetic and 1st trimester pregnancies. The scan was performed using an ultrasound machine (APLIO 300) using a trans-abdominal approach with the patient in a supine position. The verbal consent from all participating patients was taken and the history, as well as the complaints of patients, was documented. The SPSS software version 20 was used to analyze the data.

RESULTS

This current study was conducted among 80 pregnant women, out of which 40 were hypertensive pregnancies and 40 were non-hypertensive normal pregnant women, to check the relationship between fetal weight and placental thickness with hypertension. The age of patients ranged between 19 to 44 years with a mean age of 28.6 years, gravidity ranged from 1 to 7 and gestational age ranged between 19 to 38 weeks with a mean gestational age of 34.8 weeks, as shown in table 1.

Variables	N	Minimum	Maximum	Mean	SD
Age of Patient (yrs)	80	19.00	44.00	28.6125	4.05186
Gravidity	80	1.00	7.00	2.8000	1.36317
Gestational Age (wks)	80	19.00	38.00	34.8250	3.01379

Table 1: Descriptive statistics for age of patient, gravidity and gestational age

The current study compared estimated fetal weight in hypertensive pregnancy (1.9 ± 0.6 Kg) and normal pregnancy (2.7 ± 0.45 Kg) and found a statistically significant difference in the mean fetal weight of both groups, as shown in table 2.

Group Statistics	Group	N	Mean	SD	Sig (2 tailed)
Estimated Fetal Weight	Hypertensive	40	1.9975	.61565	0.02
	Normal	40	2.7100	.45336	0.02

Table 2: Comparison of estimated fetal weight in both hypertensive pregnancy and normal pregnancy groups

The placental thickness in hypertensive pregnancy was 4.1 ± 0.7 cm and in non-hypertensive normal pregnancy was 3.9 ± 0.8 cm. The placental thickness of the hypertensive pregnancy group was found to be slightly higher than the normotensive pregnancy group, but the current study observed an insignificant difference in the mean placental thickness of both groups, as shown in table 3.

Group Statistics	Group	N	Mean	Std. Deviation	Sig (2 tailed)
Placental Thickness	Hypertensive	40	4.1000	.66833	0.07
	Normal	40	3.8975	.80845	0.07

Table 3: Comparison of placental thickness in both hypertensive pregnancy and normal pregnancy group

DISCUSSION

This current study was conducted among 80 pregnant women whose age ranged between 19 and 44. They were

referred to the Radiological Department of a Private Sector Hospital in Gujrat for an ultrasound examination. The current study included 40 hypertensive pregnancies and 40 women with normotensive pregnancies to find the relationship between fetal weight and placental thickness with hypertension. The current study compared estimated fetal weight in hypertensive pregnancy (1.9 ± 0.6 Kg) and normal pregnancy (2.7 ± 0.45 Kg) and found a statistically significant difference in the mean fetal weight of both groups. The study shows that hypertensive women have less fetal weight as compared to normal women. A similar study by Elfahal et al., published recently in 2020, investigated the hypertension effects on the placenta as well as on fetus weight. Previous study considered 40 women with hypertensive pregnancies and the other 40 controls as non-hypertensive normal pregnant women [3]. It showed a statistically significant difference in the estimated mean fetus weight of pregnancies affected by hypertension and correlated it with normal pregnancy, and the current study had the same results. Another similar study by Julio M et al., published in 2019 reported a significant decline in fetal weight in hypertensive pregnancy, especially in females with severe pre-eclampsia and significantly lower fetal birth weights as compared to normal pregnancy [18]. The current study compared the placental thickness of hypertensive pregnancy (4.1 ± 0.7 cm) which was slightly higher than normotensive pregnancy (3.9 ± 0.8 cm) and found no statistically significant difference in mean placental thickness between the two groups. A study by Baloch AH et al., 2012 stated the similar changes that hypertensive disorders in pregnancy cause noticeable changes in the placenta and reported a significant decrease in placental weight while the number of cotyledons and placental thickness was almost the same in the hypertensive and normal groups [26], and the results were in line with the current study. Another similar study by Nahar L et al., in 2013 stated that the hypertension affects the placental morphometric parameters and reported that no significant difference was seen in placental thickness, but placental weight showed a significant difference in hypertensive and control groups [30]. The current study found the effect on fetal weight due to hypertensive disorders of pregnancy and investigated the assimilation between estimated fetus weight and fetal placenta thickness in hypertensive and normotensive pregnancy.

CONCLUSIONS

In conclusion, the current study determined the estimated fetal weight and placental thickness in hypertensive mothers. The mean fetal weight in hypertensive pregnancies was found to be lower than normal pregnancies and a significant difference was observed

between them, but there was no significant association observed between placental thicknesses. A hypertensive woman carries a fetus with a low weight as compared to a non-hypertensive and there was no association found between placental thicknesses.

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