

## Original Research

### Assessment of foetal outcome by uterine artery colour doppler in all high-risk pregnancies

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#### ABSTRACT:

**Background:** Uterine artery Doppler ultrasound provides relevant information about uteroplacental blood flow. The present study was conducted to assess the foetal outcome by uterine artery colour doppler in all high-risk pregnancies. **Materials & Methods:** Forty antenatal patients admitted to the OBGY department at Sri Aurobindo Medical College and the postgraduate institute were included. Data such as age group, gravida, delivery, FGR, pre-eclampsia, pre-term delivery, LBW, and oligohydramnios were recorded. **Results:** Age group 18–22 years had 8, 22–26 years had 14, and 26–30 years had 18 patients. There were 19 multigravida and 21 primigravida. There were 24 vaginal births and 16 caesareans. The difference was non-significant ( $P > 0.05$ ). The incidence of FGR, pre-eclampsia, LBW, oligohydramnios, and at least 1 adverse outcome was significantly higher in women with abnormal uterine artery doppler as compared to normal uterine artery doppler women. The difference was significant ( $P < 0.05$ ). **Conclusion:** Uterine artery Doppler screening identifies women at high risk for developing adverse pregnancy outcomes. Uterine artery doppler ultrasonography at 22–24 weeks of gestation is a significant predictor of at least one adverse pregnancy outcome, with the highest prediction for preeclampsia.

**Key words:** uterine artery Doppler, preeclampsia, ultrasonography

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#### INTRODUCTION

Uterine artery Doppler ultrasound provides relevant information about uteroplacental blood flow. In normal pregnancy, the uterine artery develops a low-impedance flow, presumably due to trophoblastic invasion. <sup>1</sup> Failure of normal trophoblastic invasion of spiral arteries leads to hypoxemia and necrosis in the placental bed, resulting in adverse maternal and neonatal consequences including pre-eclampsia, intrauterine foetal growth restriction (IUGR), placental abruption, and stillbirth. <sup>2</sup>

Evidence suggests that the persistence of a resistant flow or abnormal uterine artery Doppler velocimetry in the late second or third trimester may be associated with inadequate trophoblast invasion. <sup>3</sup> In the second trimester, uterine artery Doppler indices such as the pulsatility index (PI) and resistance index (RI) have been reported as reliable tests for the identification of women who are likely to develop pre-eclampsia, IUGR, or stillbirth. <sup>4</sup>

However, the accuracy of predicting adverse pregnancy outcomes using Doppler velocimetry remains the subject of discussion. Although several studies have reported that uterine artery Doppler velocimetry has a valuable role as a non-invasive intrauterine method for predicting pregnancies likely to be complicated by pre-eclampsia or IUGR, others have reported a high false-positive rate in an unselected population. <sup>5</sup> There is also no consensus on the best indices or the ideal gestational age for screening. <sup>6</sup> The present study was conducted to assess the foetal outcome by uterine artery colour doppler in all high-risk pregnancies.

#### MATERIALS & METHODS

This cross-sectional study comprised 40 antenatal patients admitted to the OBGY department at Sri Aurobindo Medical College and the Postgraduate Institute, Indore, who satisfied the inclusion criteria from April.

All pregnant females with high-risk pregnancies were included, while women already carrying a foetus with sonologically detectable congenital anomalies and females who did not give informed consent were excluded.

A detailed history, clinical examination, and lab investigations of the patient were done as per the protocol. The following parameters were recorded: pulse, blood pressure, and respiratory rate; pulse oximetry oxygen saturation; foetal heart sounds; and CTG. Blood loss, emergency blood transfusion,

presentation of the baby, latency of delivery, need for induction, need for section, and parity were recorded.

Post-delivery parameters such as weight of baby, mode of delivery, baby status, and period of NICU stay, postdelivery haemoglobin level after 48 hours, post-natal febrile episodes, duration of hospital stay, purpura, and the incidence of burning micturition and dysuria were recorded. The data thus obtained were subjected to statistical analysis. A P value of 0.05 was considered significant.

**RESULTS**

**Table I: Assessment of Parameters**

Parameters	Variables	Number	P value
Age group	18-22	8	0.05
	22-26	14	
	26-30	18	
Gravida	Multi	19	0.82
	Primi	21	
Delivery	Vaginal	24	0.17
	Caesarean	16	

Table I and Graph I show that the age groups of 18–22 years had 8 patients, 22–26 years had 14 patients, and 26–30 years had 18 patients. There were 19 multigravida and 21 primigravida. There were 24 vaginal births and 16 caesareans. The difference was non-significant (P> 0.05).

Table II shows that the incidence of FGR, pre-eclampsia, LBW, oligohydramnios, and at least 1 adverse outcome was significantly higher in women with abnormal uterine artery doppler as compared to normal uterine artery doppler women. The difference was significant (P 0.05).

**Table II: Uterine artery doppler in adverse pregnancy outcomes**

Pregnancy outcome	Normal uterine artery Doppler (30)	Abnormal uterine artery doppler (10)	median uterine artery PI level	Mean	OR	P value
FGR	7%	31%	1.42	1.16	4.32	0.02
Pre-eclampsia	6%	42%	1.50	1.34	10.2	0.01
Pre-term delivery	9%	31%	1.41	1.12	0.98	0.81
LBW	8%	13%	1.04	1.17	6.24	0.01
Oligohydramnios	4%	15%	1.25	1.16	3.94	0.05
At least one negative outcome	23%	86%	1.37	1.20	8.15	0.01

**DISCUSSION**

Uterine artery doppler measurements show that impedance to flow in the uterine arteries decreases with gestational age in normal pregnancies, that impedance to flow is increased in established preeclampsia and FGR, and that this increased impedance predates the onset of the clinical syndrome of preeclampsia or FGR.<sup>7</sup> There have been a number of studies that have examined the ability of uterine artery doppler velocimetry to predict complications of impaired placentation.<sup>8</sup> Most women have used a uterine artery doppler in the second trimester. Examination of the uterine circulation in the first trimester in order to predict preeclampsia and FGR, however, has increasingly been reported.<sup>9</sup> First trimester uterine doppler ultrasound has also been used to study the process of normal placentation and to screen for early pregnancy complications, but with

limited success.<sup>10,11</sup> The present study was conducted to assess the foetal outcome by uterine artery colour doppler in all high-risk pregnancies.

We found that the age group 18–22 years had 8, 22–26 years had 14, and 26–30 years had 18 patients. There were 19 multigravida and 21 primigravida. There were 24 vaginal births and 16 caesareans. Papageorghiou et al.<sup>(2012)</sup> examined uterine artery doppler findings in women with adverse pregnancy outcomes. Almost two-thirds of stillbirths that occur in the early preterm period (up to 32 weeks) can be predicted by uterine artery doppler at 23 weeks. First trimester screening studies have shown that an abnormal result increases the risk of subsequent foetal growth restriction, and such women are at particularly high risk when indices remain abnormal in the second trimester. Combining uterine artery doppler with maternal serum markers has shown that measuring

pregnancy-associated plasma protein A and free  $\beta$  human chorionic gonadotrophin in the first trimester improves the sensitivities of second-trimester doppler. These are frequently measured in Down syndrome screening, and they lend themselves to screening for pre-eclampsia. Women with abnormal first- and second-trimester serum markers constitute a high-risk group. Maternal serum placental protein 13 remains a promising method for early screening, although a recent study suggests lower sensitivities than initially reported.

We found that the incidence of FGR, pre-eclampsia, LBW, oligohydramnios, and at least 1 adverse outcome was significantly higher in women with abnormal uterine artery doppler than in women with normal uterine artery doppler. Verma et al. (2013) assessed the predictive value of uterine artery doppler imaging at 22–24 weeks of gestation for adverse pregnancy outcomes. A uterine artery doppler was performed at 22–24 weeks of gestation in 165 pregnant women with singleton pregnancies. A pulsatility index (PI) greater than 1.45 or bilateral uterine notching was labelled as abnormal on the Doppler. The pregnancy outcome was assessed in terms of a normal outcome, preeclampsia, foetal growth restriction (FGR), low birth weight, spontaneous preterm delivery, oligohydramnios, foetal loss, or at least one adverse outcome. Out of 165 patients, 35 (21.2%) had abnormal second-trimester uterine artery Doppler. In pregnancies that resulted in preeclampsia (PE) ( $n = 21$ ), FGR ( $n = 21$ ), and low birth weight ( $n = 39$ ), the median uterine artery PI was higher (1.52, 1.41, and 1.27, respectively). In the presence of an abnormal Doppler, the risk of PE [OR = 10.7, 95% confidence interval (CI): (3.91-29.1);  $p = 0.001$ ], FGR [OR = 4.34, 95% CI: (1.62-11.6);  $p = 0.002$ ], and low birth weight [OR = 6.39, 95% CI: (3.16-12.9);  $p = 0.001$ ] increases, and the risk of at least one obstetric complication [OR = 8.73, 95% CI: 3.5-21.3;  $p = 0.001$ ] was significantly high. The positive predictive value of abnormal uterine artery Doppler was highest for preeclampsia (36.84%) among all adverse pregnancy outcomes assessed.

The study's limitation is the small sample size.

## CONCLUSION

The authors found that uterine artery Doppler screening identifies women at high risk for developing adverse pregnancy outcomes. Uterine artery doppler ultrasonography at 22–24 weeks of gestation is a significant predictor of at least one adverse pregnancy outcome, with the highest prediction for preeclampsia.

## REFERENCES

- Hernandez-Andarde E, Brodzki J, Lingman G, Gudmundsson S, Molin J, Marsal K. Uterine artery score and perinatal outcome. *Obstetrics and Gynecology Ultrasound* 2002;19:438-442.
- The value of third trimester uterine artery Doppler in high-risk pregnancies for predicting adverse perinatal outcome, according to Rai and Lekshmi. 2010;2:31-35. South Asian Federation of Obstetrics and Gynecology.
- Shwarzman P, Waintraub A, Frieger M, Bashiri A, Mazor M, and Hershkovitz R. Abnormal Uterine Artery Doppler Findings in the Third Trimester Are Linked to Poor Pregnancy Outcomes. *Journal of Ultrasound in Medicine*, 32: 2107-2113, 2013.
- Segata M., Ghi T., Piva M., D'Emidio L., Arcangeli T., Pelusi G., et al. Uterine Doppler findings and perinatal outcome in small for gestational age fetuses born close to term. *Obstetrics and Gynecology Ultrasound* 2007; 30:458.
- Cruz-Martinez R, Savchev S, Cruz-Lemini M, Mendez A, Gratacos E, Figueras F. Clinical utility of third trimester uterine artery Doppler in the prediction of brain hemodynamic deterioration and adverse perinatal outcomes in small-for-gestational-age fetuses. *Obstet Gynecol Ultrasound* 2015;45:273-278.
- Gudmundsson and GS Ghosh. Uterine and umbilical artery Doppler are comparable in predicting the perinatal outcome of growth-restricted fetuses. *BJOG*. 2009;116:424-30.
- Li H., Gudnason H., Olofsson P., Dubiel M., and Gudmundsson S. Increased uterine artery vascular impedance is related to adverse outcomes in pregnancy but is present in only one-third of late third-trimester pre-eclamptic women. *Obstetrics and Gynecology Ultrasound* 2005;25:459-463.
- Schulman H, Fleischer A, Farmakides G, Bracero L, Grunfeld L. Development of uterine artery compliance in pregnancy as detected by Doppler ultrasound. *Am J Obstet Gynecol*, 155:1031-6, 1986.
- Costa FS: Which is the best period to perform a uterine artery Doppler in the prediction of pregnancy complications? *Radiology in Brazil*, 39:97-102, 2006.
- Chan, FY. Pregnancy screening by uterine artery Doppler velocimetry: which criterion performs best? *Obstetrics and Gynecology*, 1985; 85:596-602.
- Ghi T., Contro E., Youseff A., Giorgetta F., A. Farina, Pilu G., et al. Persistence of increased uterine artery resistance in the third trimester and pregnancy outcome. *Obstetrics and Gynecology Ultrasound*. 2010;36:577-581.
- Papageorghiou, Aris T.; Leslie, Karin. Uterine artery Doppler in the prediction of an adverse pregnancy outcome. *Current Opinion in Obstetrics and Gynecology*, 19(2):103-109, 2007.
- Verma D, Gupta S.: "Prediction of adverse pregnancy outcomes using uterine artery Doppler imaging at 22–24 weeks of pregnancy: A North Indian experience." *Turkish Journal of Obstetrics and Gynecology*, 13(2):80, June 2016.