

**To evaluate the role of these blood flow indices in the prediction of fetal outcome.**

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**Citation this Article:** Dr. Nitu Panwar, Dr. Deepika Meena, Dr. G.L. Meena, “To evaluate the role of these blood flow indices in the prediction of fetal outcome”, IJMSIR- June - 2020, Vol – 5, Issue -3, P. No. 421 – 424.

**Type of Publication:** Original Research Article

**Conflicts of Interest:** Nil

**Abstract**

**Background:** Abnormal fetal circulation is considered a major factor in fetal growth restriction, both as a cause and an indicator. Non-invasive investigation of fetal circulation has become possible with the use of Doppler.

**Methods:** The present study was an observational prospective study of Doppler velocimetry in predicting perinatal outcome in high risk pregnancies in Department of Radio-Diagnosis and Modern Imaging, Sardar Patel Medical College & Associate Group of PBM Hospitals, Bikaner.

**Results:** The ratio of MCA / UA RI was the sensitive (92.3%) and specific (85.7%) in predictive value in predicting adverse fetal outcome in IUGR pregnancies

**Conclusion-** This study suggests that, Doppler assessment of foeto-placental circulation including both umbilical and middle cerebral artery is a better prognostic indicator than individual vessels for the

prediction of adverse fetal outcomes in high risk pregnancies. Also the uterine artery has an important role in all cases of pregnancy induced hypertension.

**Keywords:** Pregnancy, Doppler, Morbidity.

**Introduction**

Abnormal fetal circulation is considered a major factor in fetal growth restriction, both as a cause and an indicator. Non-invasive investigation of fetal circulation has become possible with the use of Doppler<sup>(1)</sup>. High-risk pregnancy group are categories of pregnancies where the mother, the foetus or the neonate is in state of increased jeopardy. About 20-30% of the pregnancies belong to this category<sup>(2)</sup>. To improve the obstetric result, this group must be identified and given extra care. Even with the adequate antenatal and intranatal care, this small group is responsible for 70-80% of perinatal mortality and morbidity<sup>(3)</sup>. There are many causes of high-risk pregnancies. Pregnancy-induced hypertension (PIH) or gestational hypertension

being one of the most common<sup>(13)</sup>. Oligohydramnios can be idiopathic or may be associated with other conditions. Diabetes and anaemia also have many adverse fetal and maternal outcomes. Among congenital infections, toxoplasmosis is a common infection which can affect the fetus<sup>(4)</sup>. Intrauterine growth restriction (IUGR) is the generally observed consequence in above mentioned conditions<sup>(5)</sup>.

The development of Doppler ultrasound evaluation of uteroplacental and fetoplacental circulation is one of the most important achievements of modern obstetrics<sup>(6)</sup>. Doppler techniques have been the focus of interest and research activity in obstetrics, since the initial report of signals from the umbilical artery by Fitzgerald and Drumm<sup>(7)</sup>. The first application of Doppler velocimetry in obstetrics was reported by Fitzgerald, Drumm and McCallum et al<sup>(8)</sup>. It has been long assumed that insufficient uterine, placental and foetal circulations result in adverse pregnancy outcomes and that those abnormalities can be detected by the use of Doppler ultrasonography<sup>(9)</sup>.

### Materials and Methods

**Study Area:** Department of Radio-diagnosis, SPMC & A.G. OF PBM Hospitals, Bikaner.

**Sample Size:** 50 patients.

**Duration of study:** March 2018 till desired sample reached.

**Inclusion Criteria:** Third trimester pregnancies (28 weeks and beyond) with

- Pregnancy Induced Hypertension (PIH)
- Oligo/Polyhydramnios
- Anaemia
- Diabetes Mellitus
- Rh isoimmunisation
- Previous CS

### Exclusion Criteria

- 1st trimester pregnancies
- 2nd trimester pregnancies
- Multifetal pregnancy

### Abnormal perinatal outcome:

The perinatal outcome was considered abnormal when any one or a combination of the following was present.

- 1) Intrauterine death
- 2) Perinatal death
- 3) Fetal distress
- 4) Low birth weight

### Observations

Table: 1 High Risk Pregnancies Included In the Study

High Risk Factor	No. Of Cases	%
Iugr	33	66
Pih	26	52
Anemia	10	20
Oligohydramnios	10	20
Prev.Caesarean Section	5	10
Diabetes	3	6
Rh Isoimmunisation	3	6
Polyhydramnios	2	4

The table shows that majority of the cases included in high risk pregnancies were intrauterine growth restricted pregnancies (68%) followed by pregnancy induced hypertension.

Table 2. Test performance value for RI of middle cerebral artery (MCA) in IUGR

Parameter	Value	Parameter	Results%
True Positive	11	Sensitivity	42.3
True Negative	2	Specificity	28.5
False Positive	5	Ppv	68.7
False Negative	15	Npv	11.8

The middle cerebral artery RI was 42.3% sensitive and 28.5% specific in prediction of adverse fetal outcome in IUGR.

Table: 3. Test performance value for ratio of RI of MCA/ UA in IUGR

Parameter	Value	Parameter	Results%
True Positive	24	Sensitivity	92.3
True Negative	6	Specificity	85.7
False Positive	1	Ppv	96
False Negative	2	Npv	75

The ratio of MCA / UA RI was the sensitive (92.3%) and specific (85.7%) in predictive value in predicting adverse fetal outcome in IUGR pregnancies.

### Discussion

In developing countries, there is a high prevalence of adverse perinatal outcomes, of which perinatal mortality is indicative of health development in the country. In the recent decade, Doppler ultrasound has been identified as a part of examination in midwifery. Due to the incidence of hemodynamic changes in uteroplacental vessels and fetus before clinical incidence of midwifery complications, the placental and fetal immaturity could be diagnosable through blood flow measurement.

In our study the sensitivity was 69.2%, specificity 63.6%, Positive Predictive Value 87.1% and Negative Predictive Value 36.8%.

According to the study conducted by **Schulman et al** <sup>(11)</sup> in identifying IUGR, the S/D ratio of umbilical artery has got a sensitivity and specificity of 65% and 91% respectively and Positive Predictive Value and Negative Predictive Value were 43% and 96% respectively.

In our study the sensitivity and specificity were 73.8% and 71.4% respectively and the Positive Predictive

Value and Negative Predictive Value were 90.4% and 41.6% respectively.

In a study conducted by **Fernando Arias et al** <sup>(12)</sup>, he found a strong correlation between the MCA/UA ratio and neonatal outcomes. The sensitivity, specificity, Positive Predictive Value and Negative Predictive Value were 71.4%, 74.4%, 45.4% and 89.7% respectively.

According to the study done by **Serap Yalti and co-workers** <sup>(13)</sup> on hypertensive pregnancies, with respect to adverse perinatal outcomes, MCA/UA ratio had a sensitivity of 55% and positive predictive value of 68.7%. It was concluded that MCA/UA ratio was valuable for predicting the outcome of pre-eclamptic and hypertensive pregnancies. When the ratio was <1, fetal prognosis was poor.

**Guerrero Casillas MA et al** <sup>(14)</sup> concluded that in relation to perinatal death, the MCA/UA RI had a sensitivity of 100% and specificity of 91%. For low APGAR scores at 5 minutes, sensitivity was 100% and specificity was 92%.

### Conclusion

This study suggests that, Doppler assessment of foeto-placental circulation including both umbilical and middle cerebral artery is a better prognostic indicator than individual vessels for the prediction of adverse fetal outcomes in high risk pregnancies. Also the uterine artery has an important role in all cases of pregnancy induced hypertension.

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