



## Role of Uterine, Umbilical and Middle Cerebral Artery Doppler Velocimetry in The Analysis of Pregnancy With Pre- Eclampsia

### KEYWORDS

S/D ratio- systolic flow / diastolic flow ratio PI- Pulsatility Index, R/I- Resistivity index.

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**ABSTRACT** Objectives: - The aim of the study is to evaluate the role of doppler in predicting foetal outcome in patients with pre-eclampsia.

**Materials and Methods:** - Result: The study was carried out in the department of Radio-Diagnosis, JLNMCB Bhagalpur, over a period of four years on 200 women with clinical diagnosis of Pre-eclampsia. Colour Doppler study was done between 20 to 36 wks of gestational age. Both second trimester and third trimester Doppler velocimetry of uterine artery, umbilical artery & middle cerebral artery was done and results of S/D ratio PI, RI, absent or reversed diastolic flow was correlated with foetal outcome. Out of 200 patients studied in third trimester uterine artery doppler showed 90% with persistent diastolic notch, 95.5% with elevated S/D ratio, 93% had elevated RI and 92% with elevated PI. Umbilical artery Doppler at third trimester reveals 95% with elevated S/D ratio, 93.5 % with elevated PI. Reversal or absence of end diastolic velocity in 32%. Doppler velocimetry of MCA showed decreased PI in 18% of patients.

**Conclusion:** - Doppler velocimetry of uterine artery, Umbilical artery and Middle cerebral artery in patients of pre-eclampsia gives prognosis of foetal outcome. It helps to guide Gynaecologists to take timely action and plan correct treatment.

### Introduction: -

Gestational hypertension is defined as hypertension with BP > 140/90 mm of Hg. on two occasions at least 6 hrs apart after 20th week of gestation in women known to be normotensive before pregnancy and before 20 weeks of gestation. When this hypertension is associated with proteinuria, it is known as Pre-eclampsia. Most common cause of Pre- eclampsia is abnormal placentation. It is one of the initial events. Abnormal placentation are inadequate trophoblastic invasion of the maternal spiral arterioles and accelerated apoptosis of the trophoblast with abundant release of fetal DNA into the maternal circulation. This deficiency results in decreased uteroplacental perfusion. This is responsible for perinatal morbidity & mortality mainly due to its effect on the growing foetus. Doppler studies and especially colour Doppler with spectral evaluation has provided the right tool in forewarning the obstetricians about the impending problem which could become a disaster if not properly managed. The aim of the study is to evaluate the role of doppler in predicting foetal outcome in patients with pre eclampsia.

### MATERIALS AND METHODS

This study was carried out in the Department of Radio-diagnosis, JLNMCB, Bhagalpur over a period of 4 years from May2012 – April 2016. 200 women with clinical diagnosis of pre- eclampsia were evaluated for chronological scan targeted study. AFI (Amniotic fluid index), EFW (Effective foetal weight) status of foetus is assessed. Colour Doppler study was done between 20 to 36 weeks of gestational age over a period of 4 years. The findings at the time of first examination were taken into consideration. Repeat Doppler studies were performed whenever required. Doppler velocity wave form analysis of umbilical, uterine and foetal middle cerebral artery was obtained using 3-5 MHz curvilinear transducer. The uterine Artery was studied

by first identifying the placental site. If the placenta was unilateral, uterine artery of that side was studied. In case of central placenta, both uterine arteries were evaluated. Free floating loop of umbilical cord was examined to evaluate umbilical artery. The flow velocity wave forms were computed automatically, the average value of three such recording was obtained. The data regarding perinatal outcome was collected which included birth weight, number of foetal and perinatal deaths, admission in NICU, number of days in NICU & mode of delivery. S/D ratio of greater than 3 & 2.6 in umbilical and uterine arteries respectively were considered abnormal. Absent end diastolic velocity (AEDV), reversed end diastolic velocity (REDV) & persistent early diastolic notch in uterine artery were considered abnormal. Compensatory increase in diastolic flow in foetal Middle Cerebral artery (MCA) suggested brain sparing effect seen in asymmetric IUGR.

### RESULTS: -

**Table -1 Table showing age of patients in present study.**

Age(yrs)	No. Of Patients	% age.
<20	20	10%
21-25	108	54%
26-30	64	32%
21-35	08	04%

**Table -2. Location of placenta in pre eclampsia. (n-200)**

	Central	Lateral
No. Of cases	36 (18%)	164 (82%)

**Table -3. Doppler analysis of pre eclampsia. (n-200)**

Normal Doppler in pre eclampsia	16 (8%)
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Abnormal Doppler in pre eclampsia	184 (92%)
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**Table – 4. Table showing foetal outcome in present study.**

Pre-term deliveries	84	42%
Perinatal Death	26	13%
Low Birth weight (LBW)	70	35%
Foetal Distress	20	10%
Total	200	100%

**Uterine artery:** In 2nd trimester Doppler study of uterine artery was performed on 200 pts. Early diastolic notch was seen in 82 pts (41%). Elevated S/D ratio was noted in 154 pts. 140 (70%) had elevated RI and 160 pts (80%) had elevated PI. 23 pts (12.5%) had normal Doppler velocimetry. In 3rd trimester study 180 pts (90%) had persistent diastolic notch in uterine arteries, 20pts (10%) did not show. 191 pts (95.5%) had elevated S/D ratio, 9 pts did not reveal any elevation. RI was elevated in 186 pts (93%), in 7% RI was normal. Elevated PI was noted in 184 pts (92%) & was normal in 16 pts (8%).

**Umbilical Artery:** 2nd trimester Doppler study of umbilical artery reveals 108 pts (54%) with elevated S/D ratio & 82pts (41%) had normal S/D ratio. Elevated PI index was noted in 152 Pts (76%) and rest 48 pts had normal S/D ratio and absence or reversal of end diastolic flow was not detected. 3rd trimester Doppler of umbilical artery in 200pts showed elevated S/D ratio in 190 pts (95%) and normal in 10 pts (5%). PI was elevated in 187 pts (93.5%) and normal in 13 pts. Reversal or absence of end diastolic velocity was noted in 64 pts (32%) and not present in 136 pts (68%).

**Middle cerebral artery:** Middle cerebral artery Doppler study was done in 2nd trimester as well which was normal. MCA, PI was decreased in 36 pts (18%) & was normal in rest of the patients.

## DISCUSSION

The present study comprised of 200 pts and among these maximum no of patients were in the age group 21-25 yrs. Most patients in present study were multiparous and oedema was present in some of them. Our findings of Doppler of uterine, umbilical & MCA study in 2nd trimester are consistent with Battaglia et al findings. Our findings in 3rd trimester doppler velocimetry showed decreased PI in 18% of patients indicating presence of decreased impedance to cerebral circulations. Such foetuses are at high risk of poor perinatal outcome. Out of 200 pts studied in 3rd trimester uterine artery Doppler showed 90% had persistent diastolic notch, 95.5% had elevated S/D ratio, 93% had elevated RI and 92% with elevated PI. This is consistent with the findings of Fleischer et al i.e. 80%, 93%, 85% & 90% respectively. Umbilical artery Doppler at 3rd trimester reveals 95% with elevated PI reversal or absence of end diastolic velocity in 32%. These findings are consistent with Battaglia & Schulman et al findings i.e. 87%, 91% & 17% respectively. Similarly foetal outcome in the study is preterm deliveries 42%, perinatal death 13%, low birth weight 35%, foetal distress 10% that correlated well with other studies.

## CONCLUSION

We conclude that Doppler study should be the primary imaging modality of choice for fetomaternal surveillance in Pregnancy induced hypertension and Pre-eclampsia. Doppler study helps Radiologists and Gynaecologists to take timely action, plan the correct treatment and counsel the

patients in future pregnancies.

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