



## CLINICAL STUDY OF FGR CASES AND CORRELATION OF DOPPLER PARAMETER WITH PERINATAL OUTCOME

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**ABSTRACT** **Background-** One of common complication of pregnancy is fetal growth restriction which is associated with poor perinatal outcome. Early detection and timely intervention in FGR babies can significantly improve perinatal outcome. With the help of doppler, it has become much easier to pick up FGR cases early and with high reproducibility and efficacy for perinatal outcome. **Aim:** To correlate clinical finding in FGR with color doppler and perinatal outcome. To study prognostic efficacy of doppler parameter in early detection of fetal compromise. **Material And Method:** Fifty singleton pregnancy diagnosed to have FGR beyond 30 wks gestation were included in the study ,examined and followed clinically as well as doppler finding till delivery. Prognostic efficacy (sensitivity, specificity ,positive and negative predictive values) of umbilical artery and middle cerebral artery waveforms were studied using percentage. **Result-** The sensitivity and specificity of MCA PI (78%,93%)as an indicator for extent of fetal compromise in FGR was highest, though ratio such as MCA PI /UA PI as well as UA SD (>3) were comparably specific predictor for poor perinatal outcome. Absent and reverse end diastolic flow in umbilical artery is associated with poor perinatal outcome. **Conclusions-** Color doppler study is a simple ,quick and noninvasive procedure, and combine use of MCA, UA play important role in monitoring fetus and help in early detection and determine the optimal time of delivery.

**KEYWORDS :** FGR, middle cerebral artery PI,umbilical arteryPI

**INTRODUCTION-**Fetal growth restriction (FGR) is defined as sonographic estimated fetal birth weight less than the 10th percentile for gestational age,where as small for gestational age (SGA) is used exclusively to describe newborn whose birth weight is less than the 10th percentile for gestational age. Low birth weight (LBW) is defined as birth weight less than 2500gm and should not be confused with FGR/SGA, as the definition of LBW is based on irrespective of gestational age ,and clinical feature.FGR is associated with increased risk of perinatal mortality, morbidity and impaired neurological development.Clinical examination as well as ultrasound parameter helps in detection of compromised FGR fetus by doing timely intervention which is main objective of antenatal care.

**AIM AND OBJECTIVES:** 1.To correlate clinical findings in FGR with colour doppler and perinatal outcome. 2.To study prognostic efficacy of doppler parameter in early detection of fetal compromise.

**MATERIAL AND METHOD:** A prospective observational study conducted in Department of Obstetricsand Gynecology in DMCH from Jan2021--Jan2022. The study was conducted with 50 antenatal subject who where selected from outpatient and antenatal ward .All the women had single tone pregnancy of >30 wks gestation age.

**Inclusion criteria:**

- 1.All pregnant women with irrespective of age and parity with high risk factor or FGR clinically.
- 2.Normal fetal anatomy.

**Exclusion criteria:**

- 1.Multiple pregnancy
- 2.Congenital anomalies in fetus.

**Method of study :** The subjects enrolled for the study were followed up from the point of recruitment up to the time of delivery.

**Screening and diagnosis of FGR includes:**

1. Accurate determination of the gestational age which was confirmed by LMP or first trimester ultrasound.
2. Abdominal palpation to determine fundal height during each antenatal visit.
3. Ultrasound examination of a suspected SGA foetus.
4. Assessment of foetal well-being when an SGA or FGR foetus is diagnosed. This includes Doppler studies and cardiotocography monitoring(CTG).

The pregnancies were followed up and data were collected regarding mode of delivery, gestational age at birth, birth weight, 5-min Apgar score, number of foetal and perinatal deaths and admission to NICU.

The following vessels were studied with the mother in a recumbent position during foetal inactivity and apnoea.

1. Umbilical Artery (UA)
2. Middle Cerebral Artery (MCA)Flow velocity waveforms, the resistance index (R.I),pulsatility index (P.I), systolic/diastolic ratio (S/D) of umbilical artery, middle cerebral artery were noted.

**Assessment standards:**

S/D ratio, resistance and pulsatility index of umbilical artery (>2SD), middle cerebral artery (<5th percentile) for the gestational age taken according to the standard reference values.

The ratios examined were considered abnormal when:

1. MCA/UA PI ratio less than 1.08 or less than 2SD.
2. MCA/UAS/D ratio less than 1.

**Abnormal perinatal outcome parameters:**

1. Foetal demise (IUD/Stillbirth).
2. Neonatal death within 30 days.
3. 5 min Apgar score < 7.
4. Admission to NICU for >24 hrs.
5. Neonatal morbidity like hyaline membrane disease,intracranial haemorrhage, early onset septicaemia,hypoglycaemia, or neonatal hyperbilirubinemia.
6. Caesarean section for foetal distress.
7. Meconium stained liquor

**Statistical analysis:**All data was analyzed using the Microsoft Excel software. Statistical analysis of data was done after compiling and tabulation of data. The sensitivity, specificity, positive predictive value, percentage of false positive and negative results were calculated and compared with other studies.

**RESULTS:**

Demographic characteristics of the study population are depicted in Table 1. The age group range was 19-26 yrs while mean maternal age was 23 yrs. In our study, pre eclampsia was the most common cause of FGR (50%,n=25 ), followed by anaemia (35%, n=18). Out of 25 cases, 13 patients had severe pre eclampsia, severe anaemia was present in 12 cases out of 18 , 8 patients had both severe pre-eclampsia co existent with severe anaemia. Mean gestational age was 33.4 weeks as some patients needed termination due to severe pre eclampsia while some spontaneously progressed to normal labour. Majority of the patients (61%) had to undergo caesarean section, most common indication being foetal distress or meconium stained liquor and severe pre eclampsia with severe oligohydraminos.

**TABLE:1**

MATERNAL CHARECTERISTICS	N%
PARITY	
PRIMI	30(60%)
MULTI	20(40%)

PREGNANCY COMPLICATIONS	
PREECLAMPSIA	25
OLIGOHYDRAMNIOS	11
ANAEMIA	13
CARDIAC	1
MODE OF DELIVERY	
VAGINAL	19(38%)
LSCS	31(61%)
INDICATION OF LSCS	
FD/MSL	10(32%)
SEVERE OLIGOHYDRAMNIOS	5(16%)
SEVERE PREECLAMPSIA WITH SEVERE OLIGO	10(32%)
FAILED INDUCTION	6(19%)

**Table:2 Perinatal Outcome Of Study Population**

Perinatal outcome	N
Birth weight (gm)	
>2500	4(8%)
1500-2499	25(50%)
1001-1500	15(30%)
>1500	6(12%)
Live birth	46
Still birth	4
Term babies	23(46%)
preterm	27(57%)
Neonatal death	2
5 min Apgar score <7	7
Neonatal complication	14(28%)
Admission to NICU	23(46%)

Table 2 shows the perinatal outcome in the study population. 46% of the live births needed admission in NICU. Two neonatal deaths were observed. Those were the foetuses with absent or reverse umbilical artery diastolic flow. As the birth weight of most of the babies was in the range 1.5 -2.5 kg the catch up growth was fast and normal. We studied diagnostic accuracy of Doppler parameters and fundal height as well as FL/AC ratio on grey scale B mode scan (Table 3)

**Table 3 :Performance charecteristics of different parameter**

Parameter assessed	Sensitivity	Specificity	PPV	NPV
Fundal height difference(>4cm)	75%	66%	77%	64.1%
FL/AC<23.5	57%	76%	77%	55%
UA SD ratio <95 percentile	60%	68.9%	62.5%	66%
>3	59.3%	81%	82%	58%
UA PI	65%	75%	75%	66%
MCA PI	78%	93.7%	91.6%	83%
MCA PI/UA PI	54%	86.9%	86%	54%

In our study the sensitivity and specificity of fundal height measurement were found to be 75% and 66%, respectively. In all growth-retarded foetuses, the abdominal circumference is the first biometric measure to change. We studied FL/AC ratio with a cut off of 23.5, and found the sensitivity and specificity to be 57% and 76% respectively. Among the Doppler parameters, in our study UA PI and MCA PI were found to be most sensitive indicators for adverse perinatal outcome (65% and 78% respectively). While MCA PI was the most specific indicator (93.7%). The cerebro placental ratio (CPR<1) was found to have high specificity and positive predictive value than Umbilical artery SD ratio. This is due to the reason that SD ratio takes into consideration maximum velocity in systole and minimum velocity in end diastole only whereas pulsatility index involves mean velocity so that if the diastolic flow is affected the SD ratio will be altered.

**Table 4:Neonatal complication**

COMPLICATION	N	%
Intracranial hemorrhage	1	1.6
Neonatal hyperbilirubinemia	7	14
Early onset septicemia	3	6.5
Hypoxic ischemic encephalopathy	3	6.5
Nectotising enteocolitis	0	0

**CONCLUSION**

Doppler patterns follow a longitudinal trend with early changes in the umbilical artery followed by middle cerebral artery and other peripheral arteries. Compared to other methods of foetal monitoring

Doppler has proved to be more sensitive in detecting foetal compromises early and aids in the appropriate timing of delivery. In our study, MCA PI was the most sensitive and specific indicator for extent of foetal compromise in FGR, though ratios such as MCA PI/UA PI as well as UA SD (>3) were comparably specific predictors for poor perinatal outcome. Hence, if UA PI is abnormal MCA PI should be performed to know extent of brain sparing, thus emphasizing importance of studying two vessels in Doppler.

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