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## Doppler evaluation of IUGR babies at a tertiary hospital

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### Abstract

Intrauterine growth restriction is defined as the condition where fetal weight is <10 percentile, in case fetal weight is < 3rd percentile it is severe IUGR. IUGR is divided into maternal, fetal and placental causes. It is further classified as symmetric IUGR and Asymmetrical IUGR. Diagnosis of IUGR is made on USG and Doppler. Doppler study of umbilical artery, middle cerebral artery and Ductus venosus is used for prognosis in IUGR babies and also helps in deciding time and mode of delivery.

**Methodology:** Our study includes 100 subjects that includes 50 patients with normal Doppler and 50 patients with abnormal Doppler. If we see association of maternal diseases we can see maternal diabetes, maternal hypertension, heart diseases, are associated with IUGR. Similarly congenital malformation of baby were associated with IUGR. With regards to perinatal outcome we can see NICU admission, perinatal mortality, ventilatory support in more in IUGR babies with abnormal Doppler. Furthermore we can see that adverse perinatal outcome in more in babies with combined abnormal umbilical and middle cerebral artery Doppler and in those with abnormal ductus venosus Doppler. If we go towards mode of delivery we can see that LSCS is seen in 80% of patients with abnormal Doppler while those with Normal Doppler vaginal delivery is seen in 36% of patients. Regarding timing of delivery we can see that 52% of IUGR patients with abnormal Doppler and 50% of IUGR patients with normal Doppler were terminated between 34-37 weeks of gestation.

**Keywords:** Doppler, IUGR, tertiary hospital

### Introduction

Intrauterine growth restriction is defined as the condition where fetal weight is <10 percentile for gestational age or at least 2SD below the mean for gestational age <sup>[1]</sup>, if fetal weight is <3<sup>rd</sup> percentile then it is severe IUGR. Incidence of IUGR varies between 3-10% of all births <sup>[2]</sup>. IUGR can be either because of insufficient supply of nutrients to fetus or because of inadequate utilisation of nutrients by fetus, According causes are classified as Maternal, Fetal or placental. Maternal causes are chronic maternal hypertension, Pregnancy included hypertension, chronic maternal diseases, heart diseases. Fetal causes include chromosomal abnormalities, structural abnormalities, infections. Placental causes include placental mosaicism, placenta previa, circumvallate placenta. IUGR can be further divided into symmetrical IUGR and asymmetrical IUGR. Symmetrical IUGR is because of intrinsic diseases of fetus while as asymmetrical IUGR is because of placental pathology <sup>[3]</sup>.

Diagnosis of IUGR is made by ultrasound examination which includes fetal biometry Biparietal diameter, femur length, abdominal circumference, head circumference, trans cerebral diameter and effective fetal weight. The fetal surveillance is done by umbilical artery Doppler, middle cerebral artery Doppler and ductus venosus Doppler. When there is placental impedance there are Doppler changes manifested as decrease in systolic/diastolic ratio of umbilical artery or increase in pulsatility index of umbilical artery followed by Increase systolic/diastolic ratio of middle cerebral artery or decrease in pulsatility index of in middle cerebral artery and as a result there is reduction in cerebroplacental ratio. Thus the most diagnostic criteria are umbilical artery pulsatility index and cerebroplacental ratio <sup>[4]</sup>.

It has been found that on average time interval from Doppler abnormalities to fetal heart rate changes is about 2 weeks <sup>[5, 6, 7]</sup>.

### Methodology

This study was carried at a tertiary hospital of skims soura over a period of one Year. 100 patients were included in this study with clinical suspicious of IUGR and later confirmed by USG. These 100 patients were divided into two group's one group of 50 patients with normal Doppler and another 50 patients with abnormal Doppler. Then various parameters were compared between two groups.

**Table 1:** Association of IUGR with maternal diseases

Diseases	No. of patients	Percentage
Hypertension	5	5%
Diabetes	2	2%
Heart disease	1	1%
Cong. abnormalities	4	4%

**Table 2:** Perinatal outcome with abnormal Doppler (50 patients)

	No. of patients	Percentage
NICU admission	30	60%
Mortality	9	18%
Required ventilator support	12	24%

**Table 3:** Distribution of patients according to Doppler abnormalities

Total no. of patients with abnormal Doppler 50	No. of pt's	Percentage
Abnormal umbilical artery pulsatility index	25	50%
Abnormal middle cerebral artery pulsatility index	15	30%
Abnormal umbilical and MCA pulsatility index	8	16%
Abnormal ductus venosus Doppler	2	4%

**Table 4:** Relationship of altered Doppler with perinatal outcome

		NICU admission	Percentage
1.	Abnormal umbilical artery PI (25)	10	40%
2.	Abnormal MCA PI (15)	10	66.6%
3.	Abnormal MCA and UA PI (8)	8	100%
4.	Abnormal ductus venosus (2)	2	100%

**Table 5:** Mortality

1.	Abnormal UA PI (25)	0	0%
2.	Abnormal MCA PI (15)	0	0%
3.	Abnormal MCA and UA PI (8)	8	100%
4.	Abnormal ductus venosus (2)	2	100%

**Table 6:** Requiring ventilatory support

1.	Abnormal UA PI	1	4%
2.	Abnormal MCA PI 1	6.	6%
3.	Abnormal UA and MCA PI	8	100%
4.	Abnormal ductus venosus	2	100%

**Table 7:** Distribution of patients according to mode of delivery

	Abnormal Doppler (50)	Normal Doppler
LSCS	40 patients 80%	32 patients 64%
Vaginal	10 patients 20%	18 patients 36%

**Table 8:** Distribution of patients according to timing of delivery

	Abnormal Doppler	Normal Doppler
<34 weeks =	22 (44%)	10 (20%)
34-37 weeks =	26 (52%)	25 (50%)
>37 weeks =	2 (4%)	15 (30%)

## Discussion

IN our study if we see association of maternal diseases with IUGR We can see that maternal hypertension was seen in 1% of cases, diabetes was seen in 2% of cases, heart diseases were seen in 1% and congenital malformation was seen in 4% of patients. If we see perinatal outcome in patients with abnormal Doppler we can see that NICU admission was seen in 60% of patients with abnormal Doppler, perinatal mortality was seen in 18% of

patients and 24% of babies required ventilatory support. These. Results are comparable with other studies which have mortality rate of 22% and morbidity rate of 62% [8].

Abnormal umbilical artery Doppler was seen in 50% of patients, abnormal middle cerebral artery Doppler was seen in 30% of patient's abnormal umbilical artery and Middle cerebral artery pulsatility index (PI) was seen in 16% of patients and abnormal Ductus venosus was seen in 4% of patients. In our study it was seen in 100% of patients with abnormal umbilical artery, middle cerebral artery and ductus venosus Doppler. It was Seen that those babies with both parameters abnormal umbilical artery PI and middle cerebral artery PI had adverse perinatal outcome compared with those who had only one parameter abnormal (either umbilical artery or middle cerebral artery Doppler). Abnormal ductus venosus is associated with 100% perinatal mortality similar to study done by Gudmundsson *et al.* Where 80% of perinatal mortality is seen in patients with abnormal ductus venosus [9].

Regarding mode of delivery LSCS was seen in 80% of patients with abnormal Doppler compared to 64% of patients with normal Doppler, while normal delivery was seen in 36% of patients with normal Doppler, this is similar to study of Lakhakar *et al.* [8].

Regarding timing of delivery maximum patients had termination of their pregnancy between 34-37 weeks of gestation.

## Conclusion

IN our day to day practice we come across a large number of cases with IUGR, the major challenge is to diagnose IUGR and go for antepartum surveillance using Doppler.

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