Section: Obstetrics and Gynecology

Original Research Article

STUDY OF CAUSES OF LATE ONSET FETAL GROWTH RESTRICTION AND ITS OUTCOME

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Received *: 04/12/2024*
Received in revised form *: 28/01/2025*
Accepted *: 14/02/2025*

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DOI: 10.70034/ijmedph.2025.1.123

Source of Support: Nil,
Conflict of Interest: None declared

Int J Med Pub Health
2025; 15 (1); 655-659

ABSTRACT

Background: Doppler velocity study of placental and fetal circulation can provide important Information about fetal wellbeing, thus providing an opportunity to improve fetal outcome. The aim of the study is to know causes of late onset IUGR and its outcome. To asses various causes to reduce mortality.

Materials and Methods: 46 singleton pregnancies after 32 weeks of gestation diagnosed as IUGR and were prospectively examined with Doppler ultrasonogrpahy and other factors like age, parity, BMI ,SES and were correlated with maternal and fetal outcome.

Results: Of the 46 patients taken in study 65% are primigravida, with 48% being in age group between 19 to 22yrs.65% are with gestational age between 35 to 37. 39% of patients are anemic and 30% are with hypothyroidism.76% were diagnosed at more than 35wks of gestation. In Doppler Umbilical artery was normal in 91% of patients, MCA showed decreased resistance in 59% patients, CPR was abnormal in 52% cases. Mean uterine artery resistance increased in 74% cases.63% of cases delivered male babies. NICU admission is 50%. Neonatal deaths came to 6%.

Conclusion: Doppler studies of multiple vessels in the fetoplacental circulation can help in the monitoring of compromised fetus and can help us in optimising the time of delivery and predicting neonatal morbidity and mortality. Age, parity, BMI, SES, Doppler, plays role. In Doppler MCA and CPR are more effective in predicting adverse perinatal outcome than Umbilical arterty in late onset IUGR fetuses This is helpful in determining the optimal time of delivery and prevention of stillbirths after 32wks.

Keywords: Doppler; Umbilical artery; Middle cerebral artery; Cerebroplacental ratio.

INTRODUCTION

Foetal growth restriction or intra uterine growth restriction are the terms used for a foetus which has not attained its full growth potential, usually 10 centiles at a frequency of 10% of all pregnancies. Foetal growth restriction is associated with high perinatal morbidity and mortality besides long term neurological handicap.

FGR is a failure of a foetus to achieve its genetically endorsed growth potential. It is classified as early onset if onset <32 weeks gestation (usually starting in trimester) and late onset >32 weeks period of gestation.[1]

Early onset differs from late onset in its response to hypoxia usually early onset FGR changes from arterial to venous circulation but at times cardiovascular doppler and behavioural response of foetus (BPP) can occur independent of each other resulting in discordant doppler and BPP changes. Late onset IUGR is a significant clinical problem that frequently goes undetected and can contribute to 50% of unanticipated still births.

Fetal growth restriction (FGR) is a pathological condition in which a fetus has not achieved his

genetic growth potential, regardless of fetal size. It is important to understand that a fetus does not need to be small to be growth restricted and that FGR and Small for gestational age (SGR) are not synonymous. It is estimated that the majority of FGR fetuses are SGA, while 50-70% of SGA fetuses have grown appropriately but are constitutionally small.[2]

Doppler examination is based on the hemodynamic of blood circulation, involving speed, turbulences, vascular reactivity, resistance, and vascular bed geometry. All these characteristics allow the evaluation of the fetal hemodynamic response to stress.[3] The Doppler assessment is extremely useful for the evaluation of the fetal arterial circulation, of the cardiac function and of the venous system permitting a better characterization of the fetal status.[4] There is an emerging number of recent studies that confirms that cerebral vascular modifications in late onset IUGR or even appropriate from gestational age (AGA) fetuses are associated with adverse perinatal outcome and potential long term neurological sequels.[5] Early detection could potentially modify the obstetrical management and determine an optimized outcome.

L-IUGR fetuses are very fragile, despite the fact that they are not as affected by prematurity compared to EIUGR, due to increased oxygen requirements of their brain 6. Consequently they bare multiple risks mainly due to their inability to tolerate hypoxia. The reactive cerebral redistribution in L-IUGR fetuses is associated with an alteration of the brain metabolism.[7] Undetected IUGR in the third trimester of pregnancy represents the main cause of unexplained stillbirths in low-risk pregnancies. IUGR was identified in 43% respectively in 52% of unexplained stillbirths'; hence, IUGR represents the strongest risk factor for an unexplained intrauterine death.[8] Moreover, probably a number of idiopathic cases of cerebral neonatal palsy where an acute intrapartum hypoxic event could not be identified are in fact caused by an undetected L-IUGR.

MATERIALS AND METHODS

This was an Institutional based prospective observational study with majority of women belonging to Muslim community who receive prenatal care at our centre. All women attending obstetrics department of our hospital both inpatient and outpatient are booked.95% of the women in the study population belong to middle and low socio-economic status and married at earlier ages. Most of them are from urban background. Conducted at Muslim maternity and childrens hospital, Chanderghat, Hyderabad

Sample size: About 100-120 women attend the department of obstetrics daily in our hospital for prenatal care. Low birth weight is one of the major determinant of FGR. We found that 26.44% of cases having <3 birthweight percentiles of Doppler positive cases from the previous study.[8]

Considering the 95% level of confidence interval(Z=1.96) with 15% precision (d=0.15) the minimum required sample size is

n =33.21=34

The sample size is calculated using the formula.

$$n = \frac{(Z_{\frac{\alpha}{2}})^2 \times p \times (1-p)}{(d)^2}$$

$$n = \frac{(1.96)^2 \times (0.2644) \times (1 - 0.2644)}{(0.15)^2} = 33.21 \cong 34$$

By using this formula, sample size came out to be 34.

46 patients were included in study.

The study was conducted between JULY 2017to MAY 2019

Inclusion Criteria

Antenatal women with singleton pregnancy with gestation age more than 32weeks

Exclusion Criteria

- Gestational age less than 32weeks.
- Multiple gestation.
- Congenital anomalies in foetus.
- Birth weight >10th percentile according to local standards

Statistical Analysis

Data entry was done using M.S. Excel and it was statistically analysed using Statistical package for social sciences (SPSS Version 16) for M.S. Windows. Descriptive statistical analysis was carried out to explore the distribution of several categorical and quantitative variables. Categorical variables were summarized with n (%), while quantitative variables were summarized by mean±S.D. All results were also presented in tabular form and are also shown graphically using bar diagram or pie diagram as appropriate.

RESULTS

Table 1: Age wise distribution of study participants

Age	No. of Cases	Percent
<= 25	22	47.83%
26 – 30	19	41.30%
31 – 35	3	6.52%
36 & Above	2	4.35%
Total	46	

The age of the patients in this study ranges from 19 years to 36 years of which majority belonged to the age group of 19 -25 years. The BMI of the patients in this study ranges from 17 to 31. Most of them are in normal group. In present study the percentage of upper middle class is more. In present study the incidence of primigravida (65%) was more than that of multigravida (35%).

Table 2: Gestational age distribution

Gastational Age	No. of Cases	Percent
<35	5	10.87%
35 - 37	30	65.22%
> 37	11	23.91%
Total	46	

Table 3: OB score

OB Score	No. of Cases	Percent
Primi	30	65.22%
G2	6	13.04%
G3	8	17.39%
G4	2	4.35%
Total	46	

Among the OB score most of the participants were primi (65.22%), followed by G3 (17.39%).

Table 4: Indications for LSCS

Indication for LSCS	No. of Cases	Percent
Bad Obstretic History	1	3.85%
Fetal Bradycardia	5	19.23%
Cephalopelvic Disproprtion	1	3.85%
Mechonium Stained Liqur	5	19.23%
Non Recative CTG	3	11.54%
Oligohydramnios	4	15.38%
Precious Pregnancy	3	11.54%
Previous LSCS	4	15.38%
Total	26	

As per table 4 the most common indication for LSCS was Fetal bradycardia and MSL (19.23%), followed by Oligohydraminos (15.38%), previous pregnancy and non-reactive CTG were 11.54%.

Table 5: APGAR score

APGAR	No. of Cases	Percent
Good	39	84.78%
Poor	7	15.22%
Total	46	
As per table 5 good apgar score was 84.78%.		

Around 50% were not admitted and <5 days admittance was for 30.43%.>10 days NICU admission was seen in 10.87%. and around 3 were neonatal deaths.

Table 7: Association between parameters

		AGE	BMI	HB (gm%)	EFW (gm)	AFI (cm)
N	Valid	46	46	46	46	46
	Missing	0	0	0	0	0
Mean		25.78	23.78	10.567391	2124.74	10.87
Median		26.00	24.00	10.800000	2113.50	11.00
Std. Deviation		3.771	2.547	1.2042618	344.821	3.874
Minimum		19	17	8.0000	1234	2
Maximum		36	30	13.5000	3000	21

As per table 7 significant association ($p<0.05$) was seen between demographic parameters like age, BMI, weight and AFI diagnosed by Doppler.

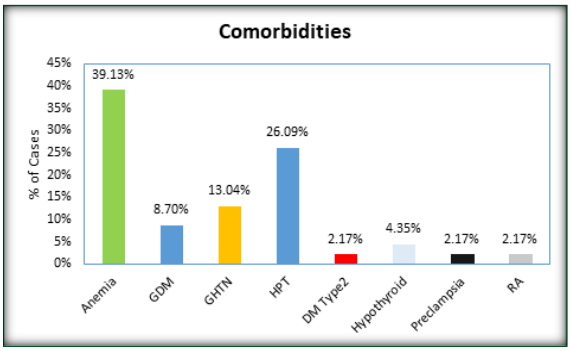

Figure 1: Comorbidities

Among the study participants most common comorbidity was anemia (39%), followed by hypothyroidism (30%).

DISCUSSIONS

Late onset FGR is associated with many short term adverse outcomes including high incidence of caesarean section,still birth,neonatal death, as well as longterm developmental outcome such as cerebral palsy and learning deficits and preponderance towards cardiovascular disease in adulthood.[9] Upto 1/3rd of foetuses with postnatal evidence of late onset FGR would be overlooked by even more sophisticated Doppler methods currently in use.Due to chronic metabolic adaptation to placental insufficiency tends to normalise fetal flow distribution, and therefore Doppler findings. This findings explain consistant challenges associated with accurate identification of late onset FGR foetuses.

Doppler changes (Oros et al., 2011). Even when prenatal Doppler assessment includes CPR,

which is shown to be the most sensitive Doppler measure of hemodynamic adaptation to late

onset placental insufficiency, only a proportion of late-onset IUGR fetuses appear to have abnormal findings Oros et al,[10] Fetal weight alone is a poor discriminator; a large proportion of fetuses with weights below the 10th centile are SGA without growth restriction, and fetuses with late-onset IUGR may have a birth weight above the 10th percentile. The potential for late gestation placental disease is implied by the known risk of stillbirth through a wide range of fetal weights (Sifianou, 2010.[11] While a decline in fetal growth from a higher initial rate is likely to be a reasonable marker of late-onset IUGR, a screening strategy employing serial growth measurements could be limited by resource availabilities.

The role of Doppler ultrasound in the study of uteroplacental and fetoplacental circulation is well known. It helps in detecting the extent of placental pathology and also predicts the fetal outcome. Numerous studies have been conducted to know the association between Doppler waveforms and perinatal outcome and have had variable results. The present study showed that abnormal Doppler waveforms was associated with adverse perinatal outcome.

The present study is a prospective observational study of 46 cases with primiparity of 65% who landed up in late onset IUGR which correlates with study conducted by Daniel Oros Lopez et al in 2010.[12]

Out of 46 cases maximum cases are in age group of 19 to 25 years, when compared with study of Daniel Oros Lopez et al.,2010,[12] which showed the same. The same when compared with Zhu Meng et.al 2016 it showed majority of cases between 30 to 34 years.[13]

In our study comprising of 46 patients 65% were delivered in between 35 to 39wks, when compared to 89% by Daniel Oroz Lopez et al 2010,[12] and according to Zhu Meng Yuan et.al 2016 maximum delivered between 36 and 38wks.[13]

In present study poor SES leading to FGR is less which when compared with study by C De Wit et.al,2013 it showed more cases of FGR with poor SES which was different from our results.14 In this study neonatal death rate came to 6% out of 46 patients 3 neonatal deaths occurred. The study done by Moraitis et.al2014,[15] and Allen et.al.,2016 showed increased stillbirth rates.[16] In our study comprising of 46 patients APGAR scores are good in 84% and poor in 16% of cases which when compared it showed more percentage of poor APGAR scores which was different from our results.In Doppler, Umbilical artery was normal in 91% patients,and increased resistance in only 8%.

The mean estimated fetal weight came to 2124.74gm. With minimum of 1234gm and maximum of 3000Gm which gave the statement ‘Late onset FGR foetuses are not necessarily small’. Out of 46 patients 39% had anemia which was supported by studies conducted by da Haas 2017 in which they said in anemia curtailed maternal blood volume expansion is linked to FGR.[17]

CONCLUSION

The present study noted an adverse fetal outcome in cases FGR which showed abnormal Doppler results. An important step in addressing this important clinical issue would be more accurate detection of late onset FGR, which would have other important clinical implications including the potential to reduce still births, as well as morbidity and health care expenditure resulting from unnecessary late preterm delivery. Doppler indices have more value in determing poor fetal outcome. Doppler patterns follow a longitudinal trend with changes in the uterine artery and middle cerebral artery mainly. Doppler investigation of the fetal circulation plays an important role in monitoring the redistributing fetus and thereby may help to determine the optimal time for delivery which is very important in late onset FGR. Doppler serves as an important yardstick for the obstetricians when dealing with pregnancies with FGR fetuses.

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