

Fetal growth restriction - outcomes in a tertiary care centre

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How to citation this article: Dr. Manoharan, Dr. PSNRS Sirisha, Dr. MG, Dhana Lakshmi, “Fetal growth restriction - outcomes in a tertiary care centre”, IJMACR- January – February - 2022, Vol – 5, Issue - 1, P. No. 131 – 137.

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Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Intrauterine growth restriction (Fetal growth restriction) is defined as estimated fetal weight less than 10th centile according to consensus of national guidelines. Fetal growth restriction is a pathological condition in which the fetus has not achieved its genetic potential, regardless of fetal size¹. The pathology can be intrinsic like congenital malformations, aneuploidy or infections where interventions are not of much help unlike uteroplacental insufficiency where fetal adverse outcomes can be reduced by monitoring and timing the delivery. Low birth weight and preterm birth remain in the list of leading causes of neonatal mortality³. It is also associated with various neonatal complications related to both preterm and growth restriction. Fetal growth restriction is one of the leading causes of perinatal mortality, accounting for 30% stillbirths, besides determining a higher frequency of premature births and intrapartum asphyxia². Here, We reviewed 827 cases of Fetal growth restriction which presented to us , their

progress and outcome along with an insight into the associated comorbidities and neonatal outcomes.

Keywords: Fetal growth restriction, Perinatal outcome, Small for gestation, Perinatal outcome

Introduction

Intrauterine growth restriction (fetal growth restriction) is defined as estimated fetal weight less than 10th centile according to consensus of national guidelines. Fetal growth restriction is a pathological condition in which the fetus has not achieved its genetic potential, regardless of fetal size. The pathology can be intrinsic like congenital malformations, aneuploidy or infections where interventions are not of much help unlike uteroplacental insufficiency where fetal adverse outcomes can be reduced by monitoring and timing the delivery. Low birth weight and preterm birth remain in the list of leading causes of neonatal mortality¹. It is also associated with various neonatal complications related to both preterm and growth restriction, low Apgar score, early neonatal deaths^{3,5,6}. Fetal growth restriction is

suspected to be the cause of 30% stillbirths and higher incidence of preterm birth and intrapartum asphyxia².

The incidence of fetal growth restriction is higher among Asian and African countries In the Asian continent countries. In developing countries i.e., like India, incidence ranges from 20 to 30 %⁴.

In our study we enrolled 827 women with fetuses identified with growth restriction in-utero and observed the birth outcome and at four weeks postpartum to note the complications of these growth restricted fetuses are prone to after birth.

Aim: The aim of this study is to identify fetuses with intrauterine growth restriction and analyze their outcomes till four weeks postpartum.

Study Period: August 2017 to August 2019.

Type of study: Prospective Observational Study

Inclusion criteria: All pregnant women with fetus identified with Fetal growth restriction by sonographic study during second or third trimester.

Method: The study was conducted on all pregnant women attending OPD/ inpatient with inclusion criteria for the study in SRIHER in the department of OBGYN.

Observations and results

Antenatal history pertaining to all trimesters is taken once the antenatal mother is detected with fetal growth restriction. The pregnancies are followed up, Ultrasound and Doppler findings collected and postnatal follow up of the neonates for 4 weeks is done. The observations and results are analysed.

In this population of 827 patients, 498 (60.21%) were primigravida and 329 (39.78%) were multigravida. Frequency of detection of small babies is equal in both primi (11.85%) and multigravida (12.04%).

70.9% of the growth restrictions diagnosed were early onset i.e detected before 32 weeks and 29.1 % were late

onset growth restricted babies (detected beyond 32 weeks). The gestational age at diagnosis was between 28 to 32 weeks in 308 (37.24%). 189 (22.9%) pregnant mothers had the diagnosis between 24 to 28 weeks and 13.3% at 22 to 24 weeks. 309 (37.36%) women fell in group 1 obesity with B.M. I ranging between 30-34.9 indicating maternal obesity does not preclude growth restriction. However, majority of women 431 (52.11%) fell within the normal B.M. I range of 25-29. Medical comorbidities have a major role as confounding factors in the BMI.

40.87% women had no pre-existing co morbid conditions, whereas 253 women (30.59%) had co-existing hypertension. Anemia was seen in 195 women (23.57%). APLA syndrome in 2.66%, cardiac disease 1.45% and renal disease 0.85% .40.87% were devoid of any comorbidities.

Of the 329 women with history of previous pregnancy related risk factors, 145 (44.1%) women had history of previous pregnancy complicated with preeclampsia, 127 (38.6%) had history of previous pregnancy ending up in stillbirth, and 57 women (17.3%) had history of delivering SGA babies in previous pregnancies.

Figure 1: Doppler changes at diagnosis and at termination.

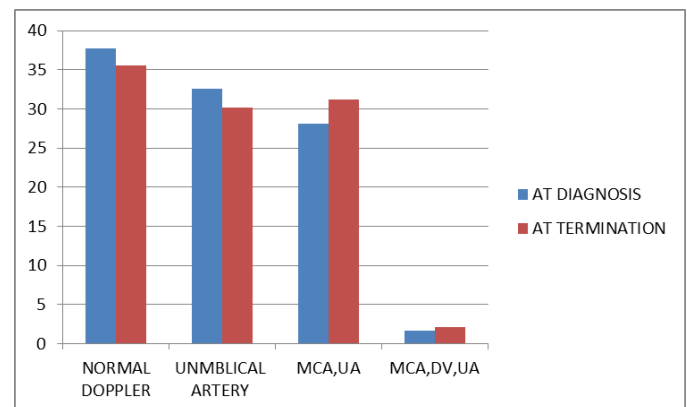


Figure 1: 37% had normal Doppler's at diagnosis and 35% remained normal at delivery MCA: Middle

cerebral artery Doppler abnormalities; UA: Umbilical artery Doppler abnormalities; DV: Ductus venosus abnormalities

In fig1, the severity of Doppler abnormalities at detection and at termination of pregnancy are shown. There is a progression of Doppler abnormalities from normal to umbilical artery changes and umbilical to further deterioration in only a small number of patients

Table 1: Indication for termination.

	<28 WEEKS (110) (13.3%)	28 – 32 WEEKS (239) (28.89%)	32 W+1D – 36 (300) (36.27%)	>36 WEEKS (178) (21.52%)
Severe preeclampsia	53(48.18%)	147(61.5%)	163(54.33%)	44(24.71%)
Eclampsia	12	19	25	8
PPROM	4	15	8	-
Worsening doppler changes	28(25.45%)	26(10.8%)	78(24.71%)	26(14.64%)
Preterm labour	13	32	26	-
Total	110	239	300	78

Table 1: Preeclampsia, maternal indication was the major one. Fetal indications were roughly half of maternal for termination of pregnancy

From TABLE 1, severe preeclampsia was the most common indication for termination followed by worsening doppler changes. Antenatal steroids were administered in 93 of 110 women who delivered at less than 28 weeks (84.54%), 208 of 239 women who delivered at 28 to 32 weeks (87.02%), 268 of 300 women who delivered at 32- 36 weeks (89.33%), and

who were mostly associated with comorbidities. Pertaining to gestational age at termination, 110 (13.30%) women were delivered at < 28 weeks, 239 (28.89%) were delivered at 28 to 32 weeks, 300 (36.27%) delivered between 32 to 36 weeks, effectively 88% preterm deliveries ,178 (21.52%) women delivered at more than 36 weeks.

154 of 178 women who delivered at more than 36 weeks (86.51%). A total of 178 (21.52%) pregnancies continued beyond 36 wks had birth weights of 68 % below 10th centile and 32% more than 10th centile. 81% less than 10th centile in 32 to 36 wks gestation, 91% less than 10th centile in gestations till 32 weeks. 80% of Apgar scores less than 7/10 were seen in babies delivered before 32 weeks with persistent low Apgar at 5 minutes for less than 50% of them.

Table 2: cord ph. and lactate at birth

CORD PH	28WEEKS (110)	28 – 32 WEEKS (239)	32W+1D – 36 WEEKS (300)	>36 WEEKS (178)
< 7.1	9 (8.18)	12 (5.02)	10 (3.33)	4 (2.24)
> 7.1	101 (91.81)	227 (94.97)	290 (96.66)	174 (97.75)
Total	110	239	300	178
Cord Blood Lactate				
< 8	103 (93.63)	225 (94.14)	295 (98.33)	169 (94.94)
> 8	7 (6.36)	14 (5.85)	5 (4.54)	9 (5)

Table 2 shows the cord ph and lactate at birth across various gestational ages at delivery.

Fig 2: Neonatal complications at birth

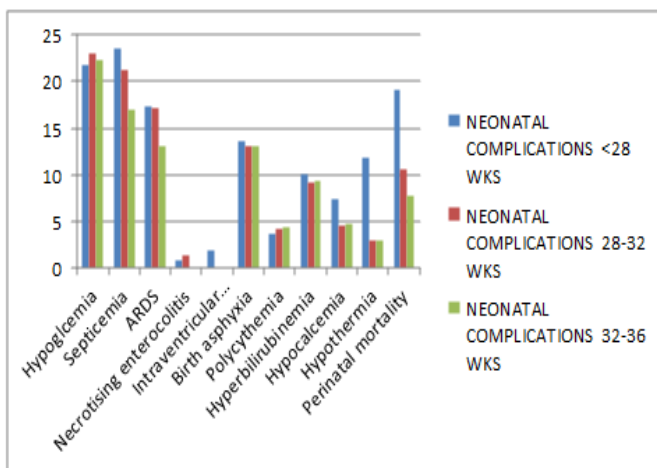
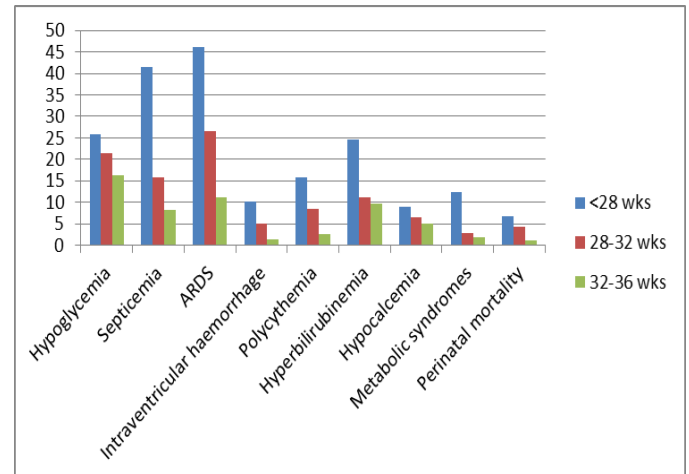


Fig 2: Gestational age grouped comparison of neonatal complications

Of the neonatal complications fig 2, Sepsis was the most common complication seen in babies born at less than 28 weeks (23.6%), followed by hypoglycemia in 28-36 wks. Intraventricular hemorrhage was seen in 28 weeks neonates and necrotising enterocolitis was not seen beyond 32 weeks.

Fig. 3: Neonatal complications at 4 weeks of birth.



ARDS: Acute respiratory distress syndrome

At 4 weeks follow up RDS and sepsis were the most common complications – 4.2% and 4.1% respectively Fig 3. In neonates born at less than 28 weeks, the most common complications observed were ARDS accounting to 46.06 % followed by sepsis accounting to 41.57% at 4 weeks of life .In 28 to 32 wks, the most common complications observed were RDS (26.63%), followed by hypoglycemia(21.49%). Hypoglycemia and hyperbilirubinemia are the commoner persistent complications at 4 wks after birth for babies born after

32 weeks. Perinatal mortality is seen in 19% at less than 28 wks and 10% at 28-32 wks.

Out of 673 placenta that were examined for histopathological changes, 258 (38.33%) had normal morphology, 334 (49.67%) had signs of infarction and 81(12.30%) had calcifications noted.

Discussion

FGR is a major economic burden in developing countries. Etiology of FGR can be genetic, maternal, placental or fetal. FGR fetus needs close monitoring for optimal management. Associated maternal risk factors should be monitored for development of complications. These infants with FGR have both short-term and long-term complications, which make them high-risk neonates.

In this study, mean maternal BMI was 25.29kg/m² unlike Thame study. Low maternal weight and maternal weight gain were directly related to fetal anthropometry in Thame et al study⁷.

Study by Moh et al⁸, had findings of primigravida mothers, delivering regardless of their age, babies with lower birth weights. This is not in consistence with our present study where majority of the participants were primigravida (60.21%) and 39.79 % were multigravida. Majority of the FGR were first diagnosed between 28-32 weeks.

Fetal gender which constituted about 51% female and 50% male had no significant difference in neonatal outcome similar to peacock et al and quinones et al.^{9,10}

Literature reports that Apgar score had significant difference between <28 weeks and ≥28 weeks. These observations are expected due to the physiological cardio-respiratory distress in extreme preterm neonates, however they are comparable to same gestational age preterm neonates with normal Doppler.¹¹

RDS prophylaxis (corticosteroids) has significant difference in Apgar and one year survival. Corticosteroid administration in two doses 24 hrs apart reduces perinatal mortality, respiratory distress syndrome and cerebral sequele.¹²

Deorariet al¹³. [74], in their study on 144 SGA babies, the most common morbidities was hypoglycemia (17%) and polycythemia (10%). which is consistent with our study, having hypoglycemia as common morbidity for babies delivered at 28-32 weeks, 32-36, >36 weeks. 25 to 60% stillbirth in IUGR have shown placental insufficiency^{14,15}.

The WHO Collaborative Study¹⁶ found that mothers with a BMI in the lowest quartile are associated with the risk of producing an IUGR infant. But in our studies majorities (52.11%) were in overweight BMI group which is inconsistent with the other studies.

In Wilkins-Haug et al¹⁷, confined placental mosaicism occurred more in IUGR infants' placenta compared to AGA infants {(11/70 (15.7%) and 1/70 (1.4%) respectively (p=0.008). Placental histology in their study showed various changes like greater decidual vasculopathy, infarction, and intervillous thrombus formation. In our study also the histological study of placenta shows infarction in majority (50%) of the specimens

In the present study, normal Doppler study was noted in 35.8% of cases and Doppler changes was noted in MCA and umbilical artery in 31.2% of cases and 30.95% of cases had changes in umbilical artery alone. Umbilical artery abnormalities with fetal weight at third centile have been shown to correlate with adverse perinatal outcome from PORTO study.¹⁸

Visser et al studied the prognosis of survival of preterm neonates comparing different birth weights at similar

gestational ages. Survival appeared to be directly proportional to the weight centiles for gestational ages near to the viability period¹⁹. Hence 26 weeks was suggested cutoff for active intervention in FGR.

The TRUFFLE trial (Trial of randomized umbilical and fetal flow in Europe) was done to find the best indicator for immediate intervention and delivery in a preterm fgr and found that late DV changes were better than early DV and cctg²⁰. Similarly DV changes were taken to decide upon delivery in early gestations i.e before 32 weeks. Hence there is a delicate balance of management between preventing perinatal death and giving a baby with extreme preterm risks.

Conclusion

In our observational study involving 827 women, majority were primigravida. The gestational age at diagnosis of FGR was mostly found between 28-32 weeks. Majority had no known comorbidities. In multigravida, history of previous pregnancy complicated with preeclampsia was a major risk factor for FGR in current pregnancy. The gestational age at termination was mostly around 32 to 36 weeks with the most common reason being severe preeclampsia and worsening of doppler changes. More than 95 % of the women were covered with steroids at the time of termination. 80% of neonates born at less than 36 weeks had birth weight less than 10TH centile but only 68% of neonate born after 36 weeks of gestation had birth weight less than 10TH centile. Cord pH and cord lactate were satisfactory for more than 93% of the neonates identified in utero with fetal growth restriction. Of the neonatal complications, sepsis, hypoglycemia and ARDS were the commonest at neonates born less than 28 weeks. In neonates delivered at more than 36 weeks, hyperbilirubinemia has been found to be an additional

complication. At 4 weeks postpartum, sepsis and ARDS were the most common complications encountered, followed by hypoglycemia and hyperbilirubinemia. Thus, outcome of pregnancies complicated with fetal growth restriction depends on gestational age at diagnosis, estimated fetal weight and doppler changes during serial ultrasound follow-up, steroid coverage and gestational age at termination.

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