

Fetomaternal Outcome in Pregnancy with Intrauterine Growth Restriction**Sushma Mogri¹, Rajkumari Samar², Pragya Gupta³, Khushboo Patel⁴, Neelam Toshniwal^{5*}**¹Associate Professor, Department of Obstetrics and Gynecology, Geetanjali Medical College and Hospital, Udaipur²Associate Professor, Department of Obstetrics and Gynecology, Geetanjali Medical College & Hospital³Postgraduate Resident, Department of Obstetrics and Gynecology, Geetanjali Medical College and Hospital, Udaipur⁴Consultant, Dharmi Multispeciality Hospital, Koteswar, Gandhinagar⁵Assistant Professor, Department of Obstetrics and Gynecology, Geetanjali Medical College and Hospital, Udaipur

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Abstract:

Present study was conducted at Geetanjali Medical College and Hospital Udaipur from February 2019 to July 2020. 150 Cases were taken from obstetrics and gynaecology department attending the OPD and admitted in maternity having IUGR pregnancy. Detailed history and examination, type of IUGR, co-morbidities were documented with the help of Performa. Women were followed up till deliveries and their babies were followed up till discharge from hospital. Various maternal, fetal and perinatal outcomes were observed in this observational study. Maximum numbers of patients had pre pregnancy weight more than 60 kg, about 55.33% patients gained more than 7 kg weight in pregnancy and 58.67% patients fall under BMI 25-29.9 group. Incidence of symmetrical IUGR was 2%. Most common maternal risk factor was oligohydramnios(47.62%). Ultra-sonographic parameters at 36 weeks of gestation like AFI, BPD, AC, HC, FL, HC/AC found less as compared to normal fetuses but HC/AC has been proved accurate marker, which can help in diagnosis of IUGR. Maximum patients(84.67%) with IUGR were delivered by caesarean section. In a view of perinatal outcomes, 24% cases had APGAR < 7 and 16.67% preterm deliveries are seen. Only 5 intra uterine deaths were found. About 41% neonates needed NICU admission. 25.33% suffered from hypothermia, 8% required ventilator support and only 4.67% neonatal deaths were noticed.

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Introduction

Intrauterine growth restriction (IUGR) is a term used to describe the condition of a fetus whose size or growth is subnormal. IUGR is a global phenomenon which is associated with significant neonatal morbidity and mortality.

IUGR is a term used for fetuses with birth weight <10th percentile of those born at the same gestational age or two standard deviations below the population mean are considered as growth restricted [1]. It can further be classified as [2]

Moderate: Birth weight in the 3 to 10 percentile (or 5th to 10th centile)

Severe: Birth weight less than 3 percentile (or <5th centile)

The incidence of IUGR varies between 4-7% in developed countries and up to 30% in developing countries. In India it is 25-30% [4]. The high incidence of IUGR in developing countries is multi-

factorial and involves a complex interaction between foetal, placental and maternal factors.

The prenatal diagnosis of IUGR is based on clinical as well as ultrasonographic (USG) examination. USG is considered more accurate with less intra-observer variations. Sonographically foetus with estimated weight <10th percentile for gestational age and abdominal circumference less than 10th percentile is considered growth restricted [3].

Three types of IUGR have been found [9,10].

1. Symmetrical IUGR (Hypoplastic small for date) [9,10]

Symmetric growth restriction begins early in gestation in which cell number is reduced. It is caused by intrinsic factors such as congenital infections or chromosomal abnormalities, etc.

2. Asymmetrical IUGR (Malnourished babies) [9,10]

Abnormal growth typically begins in the late second or third trimesters. The cell numbers are normal but cell size is reduced.

It is due to reductions in fetal nutrients that limit glycogen and fat storage, caused usually due to placenta disorders.

3. Mixed IUGR [9,10]

It is having decrease in the number of cell and cell size. It occurs mostly when IUGR is affected further by placental causes in late pregnancy. It represents the clinical features of both symmetrical and asymmetrical IUGR.

IUGR is caused by maternal, fetal or placental factors.

Foetal Factors: Genetic diseases, Congenital malformations, Foetal infections, Multiple pregnancy.

Maternal Factors: Low socioeconomic status, Under nutrition, Anaemia, Multiparty, Inadequate prenatal care, Teenage pregnancies [5], Short inter pregnancy interval [6], Previous IUGR births [7,8] smoking, alcohol, tobacco chewing, Chronic illness (hypertension, diabetes, cardiopulmonary diseases)

Placental Factors [13-16]: Abnormal uteroplacental vasculature, Placental dysfunction (PIH, preeclampsia)-Thrombophilia-related uteroplacental pathology, Avascular villi, Decidual or spiral artery arteritis, Multiple infarctions, Partial molar pregnancy, Syncytial knots, Abruptio placenta, Velamentous umbilical cord insertion, Placental hemangioma, Placental infections, Infectious villitis

IUGR leads to increased risk of intrapartum asphyxia, preterm delivery, and risks associated with preterm delivery, respiratory distress syndrome, sepsis, seizures, inter ventricular haemorrhage and necrotizing enterocolitis [11,12].

About 50-75% perinatal morbidity and eight to ten folds increased in mortality has been found among growth restricted foetuses as compared to appropriately sized foetuses [5]. Those foetuses who have suffered from IUGR are prone to develop still birth, Intrapartum foetal acidosis, Perinatal asphyxia, Meconium aspiration syndrome, Hypoglycaemia, Hypocalcaemia, Hypothermia and Hypoxic ischemic encephalopathy etc.

This study was carried out to find out the maternal and foetal outcome of IUGR pregnancy in tertiary care Geetanjali medical college and hospital from February 2019 to July 2020.

Aims & Objectives

Aim

•To study the incidence of IUGR pregnancies in Geetanjali Hospital from February 2019 to July 2020 and its maternal and foetal outcome.

Objectives

Primary Objective:

- 1) To determine foetal outcome in terms of low birth weight, APGAR score at time of delivery, NICU admission and mortality.
- 2) To determine perinatal outcomes in terms of intra uterine deaths and still births
- 3) determine the outcome of IUGR pregnancy in terms of mode of deliveries

Secondary Objectives:

- 1) To know incidence of asymmetrical and symmetrical IUGR in Geetanjali Hospital from February 2019 to July 2020.
- 2) To study the risk factors of IUGR and their association with maternal risk factors.

Material and Methods

This is an observational study conducted from February 2019 to July 2020 in the Department of Obstetrics and Gynaecology in a tertiary care hospital. 150 patients were enrolled for the study. All the women had a singleton pregnancy. IUGR was diagnosed clinically and then confirmed by ultrasound parameters with estimated foetal weight less than 10th percentile for the gestational age.

Study Area- Department of obstetrics and gynaecology GMCH, Udaipur

Study Design – An observational study

Source of Data – All the antenatal patients admitted to GMCH from February 2019 to July 2020.

Population – All antenatal cases attending OPD and admitted in maternity in between February 2019 to July 2020.

Study Technique – purposive conservative sampling

Minimal Sample Size – 66 calculated by given formula

Sample Size Calculation :-

$$N \geq \frac{(Z_{1-\alpha/2})^2 P(1-P)}{d^2}$$

Where

N is sample size

$Z_{1-\alpha/2}$ is 95% confidence interval=1.96

P is prevalence of foetal morbidity (NICU admission) in IUGR pregnancies based on previous study [43] = 22.2%

d is 10% absolute error rate.

Inclusion Criteria –

- 1) Patients who give consent for study
- 2) Patients having ultrasonography finding of IUGR irrespective of gestational age.

Exclusion Criteria-

- 1) Patients lost to follow up.
- 2) Multi foetal pregnancies.

Method-

- The patients enrolled for the study were followed up from the point of recruitment up to the time of delivery.
- Careful antenatal examination was carried out at each visit and blood pressure was noted, maternal co morbidity was evaluated and assessed.
- All patients were subjected to USG and Doppler studies of the uterine artery, umbilical artery and the middle cerebral artery was evaluated as and when required.
- All patients were evaluated first by grayscale ultrasound. Foetal weight was estimated according to Hadlock's formula. AFI was calculated by adding the vertical depths of the largest pocket of liquor in each of the four uterine quadrants, free of umbilical cord loops.
- Expected date of delivery was calculated by Naegele's formula (EDD=LMP+9m7d). 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, neonatal complications or morbidity and admission to NICU along with its duration.

Pregnancy Complications

$$\frac{\text{number of new cases of specific disease during a given time period} \times 100}{\text{population at risk during that period}}$$

Results

- Maximum numbers of patients 70.66% were from 21-30 years of age group. Among which maximum were primigravida.
- Majority of IUGR pregnancies were found among middle class, 48.67% than lower and upper class.

1. GHTN
2. Pre eclampsia
3. Gestational Diabetes
4. Hypothyroidism
5. Anaemia
6. Bad obstetric history
7. Oligohydramnios
8. Fetal Congenital anomalies
9. Long birth interval

Abnormal Perinatal Outcome Parameters

1. Foetal demise (IUD/Stillbirth)
2. Birth weight
3. Neonatal death within 30 days.
4. APGAR score <7.
5. Admission to NICU and need of ventilator
6. Long hospital stay >5 days.
7. Neonatal morbidity like neonatal hypothermia, hyperbilirubinemia, intracranial haemorrhage, early onset septicemia.

Proposed Statistical Analysis

Analysis of collected data has been done on the basis of statistical tools and techniques. Data has been presented in form of tables and charts and graphs such as bar diagram and pie chart. Analysis of data has been done on the basis of inferential statistics and descriptive statistics whatever was required to fulfil the objective.

Incidence is calculated by formula as follow

- About 93% cases were booked and they took regular antenatal visits.
- Maximum numbers of patients had pre pregnancy weight >60 kg, about 55.33% patients gained >7 kg weight in pregnancy and 58.67% patients fall under BMI 25-29.9 group.

Table 1: Maternal bmi and iugr

BMI(kg/m ²)	No.	%	Avg. birth weight (kg)
<20	1.00	0.67%	1.24
20-24.9	46.00	30.67%	1.89
25-29.5	88.00	58.67%	2.11
≥30	15.00	10.00%	2.01

Table 2: Symmetrical and asymmetrical iugr

IUGR	No.	%
Asymmetrical	147	98.00%
Symmetrical	3	2.00%

In present study out of 150 IUGR babies, 147 are asymmetrical IUGR.

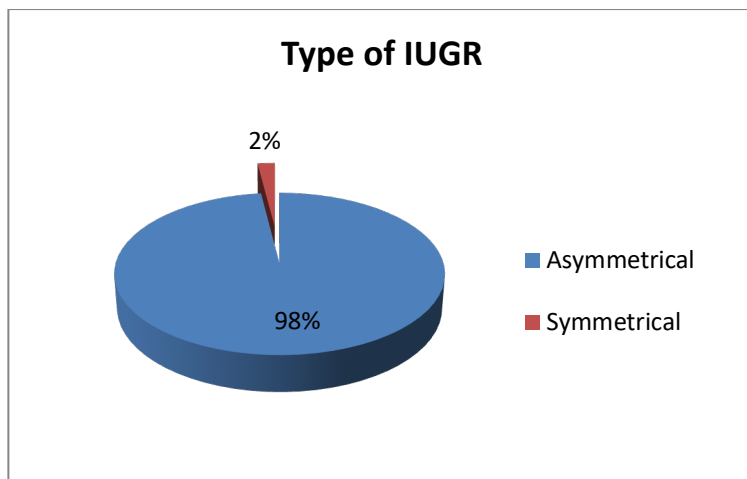


Figure 1

Table 3: Distribution of cases in relation to pregnancy complications

Pregnancy Complication	Present Study		Type of IUGR	
	Number	Percentage	Asymmetrical	Symmetrical
GHTN	27	18%	27	0
Pre-eclampsia	17	11.56%	17	0
Gestational Diabetes	5	3.40%	5	0
Hypothyroidism	36	24.49%	36	0
Anemia	12	8.16%	12	0
Bad obstetric history	4	2.66%	4	0
Oligohydramnios	70	47.62%	70	0
Fetal Congenital anomalies	5	3.33%	2	3
Long birth interval	23	15.3%	23	0

- Most common maternal risk factor was oligohydramnios, 47.62%. Second most common risk factor was pregnancy induced hypertension.

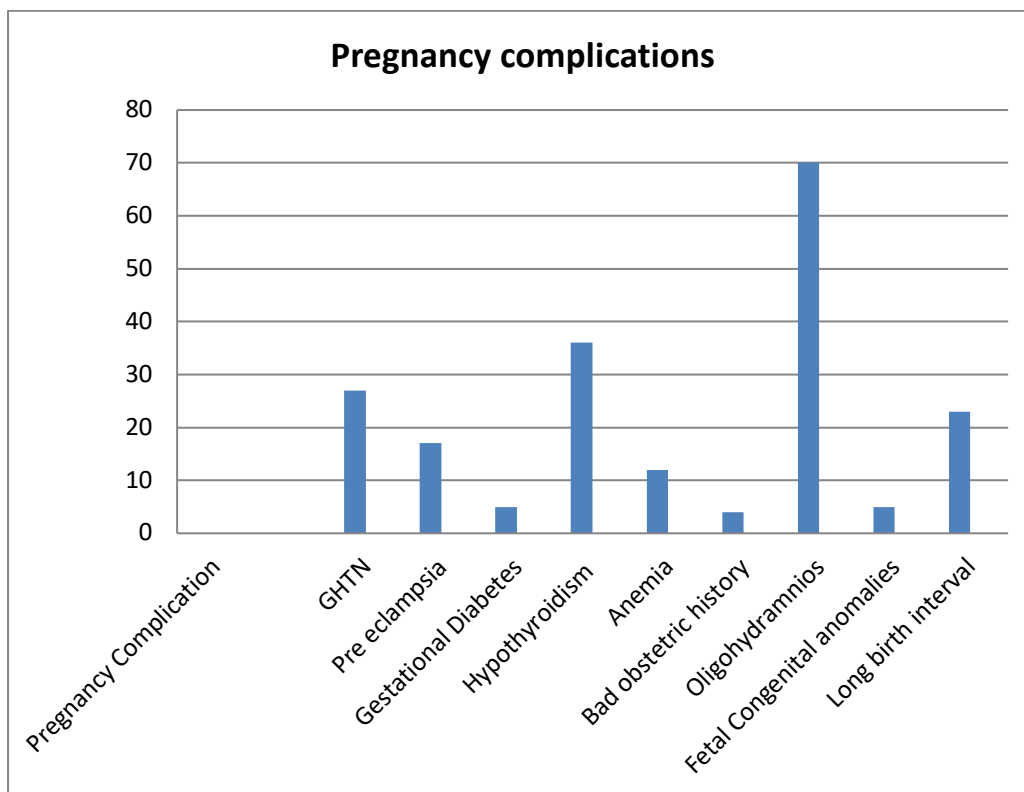


Figure 2: Pregnancy complications

Serial fundal height monitoring showed significant role in diagnosis of IUGR.

Table 4: Ultrasonographic parameters at 36 weeks

	Study group	Normal cases
Mean AFI(cm)	8.1	>12
Mean BPD(mm)	86.7	90
Mean FL(mm)	66.7	70
Mean HC(mm)	326	327
Mean AC(mm)	283	324
Mean HC/AC	1.15	1.02

- Ultra-sonographic parameters at 36 weeks of gestation like AFI, BPD, AC, HC, FL, HC/AC found less as compared to normal foetuses but HC/AC has been proved accurate marker, which can help in diagnosis of IUGR.

Table 5: Doppler changes and IUGR

	Cases	Percentage
Abnormal doppler	51	34%
Normal doppler	94	62.67%
No Doppler	5	3.33%

In present study we found 34% patients with abnormal doppler findings 62.67% had normal doppler and 3.33% had no doppler findings as they were intrauterine foetal demise

Table 6: Comparison of various Doppler indices of IUGR pregnancy (n=51)

	PI value	
	>1	<1
Abnormal flow in umbilical artery	32(62.7%)	19(37.55%)
Abnormal flow in MCA	23(45.01%)	28(54.9%)
Abnormal CPR ratio(MCA PI/UA PI)	10(19.61%)	41(80.39%)

In our study we found 62.5% cases with umbilical artery PI value >1 and 54.9% cases have Middle Cerebral Artery PI value <1 and 80.39% patients had CPR ratio <1.

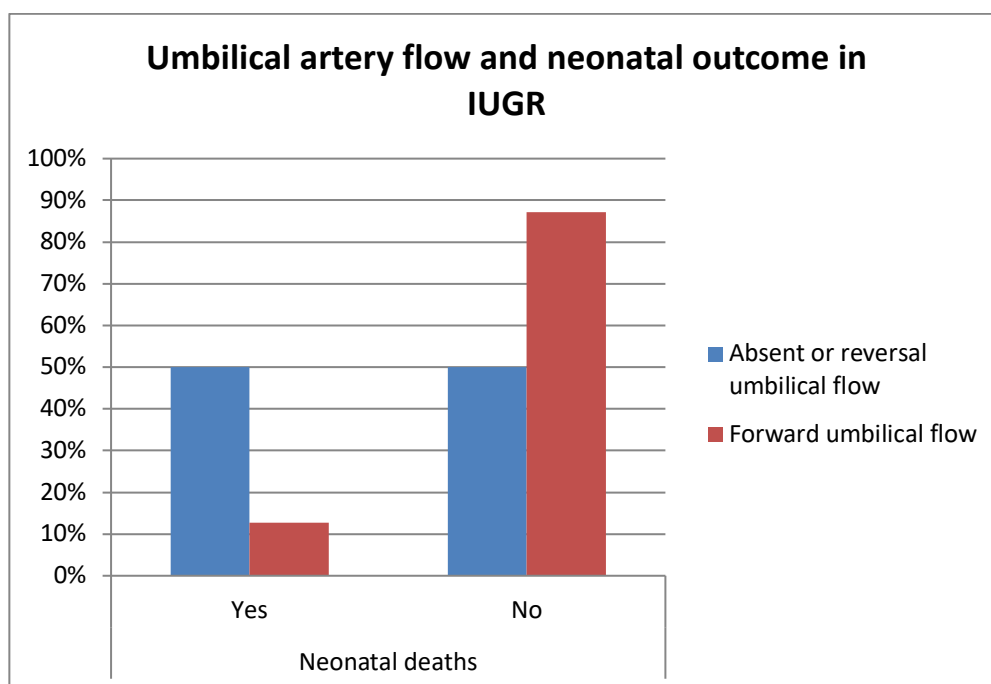


Figure 3: Umbilical artery flow and neonatal outcome in IUGR

- Maximum neonatal deaths were found,50% among cases who had absent or reversal umbilical artery flow than forward umbilical artery flow.
- Maximum patients with IUGR were delivered by caesarean section, 84.67%. Among which maximum elective caesareans were conducted

for oligohydramnios with IUGR on account of abnormal placental perfusion and major factor was pregnancy induced hypertension.

- Maximum emergency caesareans were indicated for intrapartum foetal distress and preeclampsia those were 13 and 12 cases among 37, respectively.

Table 7: Perinatal outcome and mortality

	Cases	Percentages
IUD	5	4.67%
APGAR < 7	36	24.00%
PRETERM BIRTH	25	16.67%
MECONEUM STAINED LIQUOR	10	6.67%

In a view of perinatal outcomes, 24% cases had APGAR < 7 and 16.67% preterm deliveries are seen. Only 5 intra uterine deaths were found.

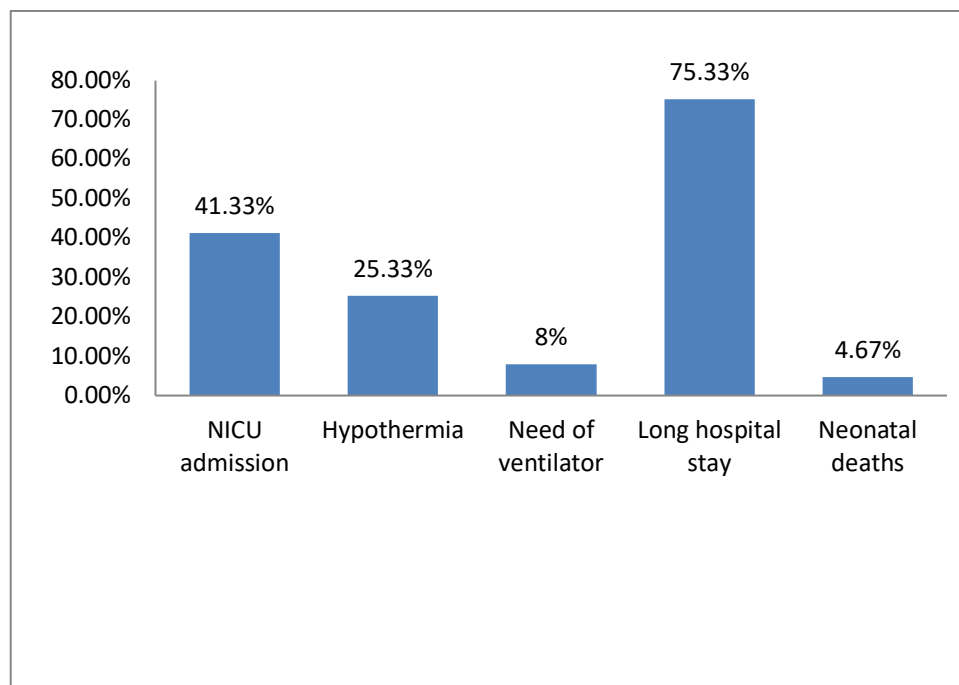


Figure 4: Neonatal outcome

- In respect to neonatal outcomes, maximum neonates 75.33% had long hospital stay that was more than 5 days. About 41% neonates needed NICU admission. 25.33% suffered from hypothermia, 8% required ventilator support and only 4.67% neonatal deaths were noticed.
- Maximum neonates had birth weight less than 2.5 kg, around 76.67%.

Discussion

According to age wise distribution maximum numbers of patients were from 26 to 30 years of age which is commonest age group of obstetrics patients. Similar results were found in Manandhar T et al, 2018 [17].

In our study maximum about 44.67% patients were primigravida may be because diseases like PIH, Diabetes Mellitus, and Rheumatic heart disease are more common in primigravida patients who were complicated by IUGR. It is similar to DD Motghare et al, 2014 [18] results, in which they observed women with lower parity were more likely to have an IUGR baby compared to those with higher parity. We found maximum number of patient from middle class that is because our institute is corporate hospital and we have maximum patients with middle class family. And no significance difference found in lower and higher socio economic status which is similar to cavalcante, n.c.n. et al, 2017 study. [19] In the present study there were 11 cases who did not

take antenatal care and maximum patients were booked. This suggests antenatal follow ups can't truly prevent growth restriction but rather improves perinatal and maternal outcome in pregnancies with IUGR. Which is similar to Shenoy HT et al, 2019 study results. [20]

In present study we found 58.67% cases had BMI in between 25 and 29.5. They have 2.11 kg mean baby weight and ≥ 30 BMI group had 2.01 kg mean baby weight that reflects poor pre-pregnancy maternal BMI had a significant effect on birth weight of baby which matches Desai M et al study in 2011 [21]. Thus by this we can say high maternal BMI is significant risk factor for IUGR.

In this study we found maximum patients around 47.62% with oligohydroamnios which suggests IUGR and oligohydroamnios are strongly associated with each other which is similar to Manandhar T et al, 2018 study [17]. In this study we found around 29.5% patients who had PIH in form of either Gestational Hypertension (18%) or preeclampsia (11.56%). Which is comparable to Muniyar N 2017 study results. [22] in their study oligohydroamnios and PIH were most common complications associated with IUGR.

In present study, fundal height was taken in all booked patients at each antenatal visits. Cases of twin, polyhydramnios, transverse lie are not included in the study. It is evident from the above table that fundal height in the present study group was very less as compared to the normal cases at the same gestational age. Fundal height is sensitive predictor of IUGR which is comparable to Sinha S et al 2018 study [23]

In present study, all the parameters were found less than they are found in normal baby of 36 weeks gestational age but HC/AC ratio was a good predictor for diagnosis of IUGR by USG. This ratio compares the most preserved organ in malnourished foetus, the brain represented by HC and liver by AC. IUGR is present when HC/AC ratio is greater than 95th percentile for the gestational age and in our study we found it greater than 95th centile.

In our study, among 51 patients with abnormal Doppler study maximum patients had umbilical artery PI value > 1 that was in 62.7% patients. Among all patients 54.9% patients had MCA PI < 1 and CPR PI < 1 was found among 80.39% patients which are similar to Gupta, et al 2016 [24] study which suggests CPR PI < 1 is having more association with SGA babies.

In our study, we found 50% neonatal deaths among patients having absent or reversal umbilical flow and only 12.77% among umbilical artery forward flow. Which suggest perinatal mortality increases with worsening of Doppler which is comparable with moregaroli et al 2002 [25] study.

In our study, we found chances of operative delivery are more in IUGR pregnancy which is comparable to Muniyar N 2017 study [22]

In our study, we found around 71% caesareans were elective among which maximum were indicated for oligohydroamnios with IUGR which is comparable with Manandhar et al 2018 study [17].

In present study, 29.13% caesareans were emergency among which maximum were indicated for intra partum foetal distress and preeclampsia 35.14% and 32.43% respectively.

In our study, we found 24% newborns who had one minute APGAR was < 9 . We found 16.67% preterm birth. This suggests IUGR pregnancy has higher risk of low APGAR score which is comparable with preterm birth which is comparable with Gupta et al 2018 study [24].

Rates of NICU admission were also high in our study which is comparable with Muniyar et al 2017 study observations. In present study we found maximum neonates had long hospital stay which may be because of preterm birth, weight gaining, hyperbilirubinemia and need of ventilator support. We found only 4.67% neonatal deaths, which is similar to Muniyar et al 2017 [22] study results.

In our study, we found maximum newborns with low birth weight of 1.51 to 2.49 kg those were 52.67%. 23.33% were normal birth weight and 17.33% were very low birth weight

Conclusion

IUGR is a global issue which is associated with increased neonatal morbidity and mortality. Intrauterine growth restriction is commonly found and may occur even when the mother is in good health. However some factors may increase the risk of IUGR such as nicotine consumption birth of growth restricted baby has major effect on mental health of mother as well as family members which may be due to lack of knowledge about IUGR.

Adequate preconception counselling & life style modifications, antenatal care, improvement of the knowledge of the mothers regarding antenatal care, education about ominous sign during pregnancy e.g. sudden weight gain, headache, pedal edema, blurring of vision, importance of hematinics for prevention of anaemia helps to reduce the complications associated with IUGR

It has been concluded that maternal high BMI plays major role in development of IUGR. So awareness regarding weight reduction before pregnancy planning and maintenance of weight gain should be kept in mind of an obstetrician as well as general population.

Simple clinical methods like maternal weight gain, fundal height measurements may suspect IUGR and serial USG can confirm diagnosis.

It has been concluded that Doppler changes are not necessary in all IUGR cases but still Doppler studies have an important role to play in the assessment of fetal wellbeing because the changes occur at a time when other tests are still normal and it helps in decision making, whether to continue pregnancy or terminate. Birth weight is as yet the single best indicator to assess past in-utero events and future trajectory of life.

IUGR pregnancies have more chances of being terminated operatively as they are mostly associated with oligohydramnios and pregnancy induced hypertension and those who get trial of labour also have more chances of intra partum foetal distress and thus end up in emergency operative deliveries only.

Careful supervision during intrapartum & immediate postpartum period helps in reducing neonatal complications. Well-equipped NICU with expert neonatologist at the time of delivery helps in reducing the role of neonatal morbidities and mortality.

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