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STUDY OF INTRAUTERINE GROWTH RESTRICTION IN PREGNANCY AND THE MATERNAL AND PERINATAL OUTCOME IN A TERTIARY CARE CENTRE.

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ABSTRACT

BACKGROUND: Intrauterine growth restriction (IUGR) is still one of the most common causes of foetal morbidity and mortality, as well as neonatal mortality and morbidity. It's mostly accountable for the high number of perinatal deaths. IUGR is described as a rate of foetal growth smaller than the typical growth expected during a certain gestational age and can be caused by a variety of maternal, foetal, and placental variables. Birth weight less than two standard deviations or less than the 10th percentile of the mean for a certain gestational age is considered small for gestational age (SGA). Neonatal mortality has decreased significantly in recent decades as a result of developments in antenatal and neonatal critical care, as well as management of low birth weight babies, although stillbirth rates have remained stable. These children in the later stage of life can develop developmental delays, cerebral palsy, mental retardation and long-term health issues. In the current article, we discuss regarding the incidence of IUGR in study population, and the associated maternal diseases along with perinatal outcome. **METHOD:** The study was done in a peri-urban tertiary care centre in Nagpur from January 2021 till December 2021 for a duration of 1 year, where 100 women with diagnosed Intra Uterine Growth Restriction were admitted and followed up. Demographic characters were noted and maternal and fetal monitoring was done regularly. Mode of delivery was planned according to gestational age, degree of IUGR, doppler changes. Maternal and perinatal outcome and complications were noted. **RESULTS:** 100 cases of IUGR were recruited for the study from January 2021 till December 2021 for a duration of 1 year out of total of 1246 deliveries which were recorded in the hospital during this time period. In the present study, the incidence of IUGR was 8.02%. Pregnancy Induced Hypertension was the most significant risk factor associated with IUGR which was 53%, followed by anaemia- 12%. Previous pregnancies which had IUGR with IUGR in this pregnancy were found in 9 patients. Of the 64 LSCS, foetal distress was the commonest indication (33 cases, 51.5%) followed by abnormal Doppler findings (17 cases 26.5 %). 86 % of babies had asymmetric IUGR while patients with symmetric IUGR were 14%. **CONCLUSION:** IUGR leads to the causes of neonatal and perinatal mortality and morbidity. It can be easily assessed at an early stage. Serial clinical, ultrasonographic and doppler follow up will help in diagnosing IUGR and decision making to avoid intrauterine demise, neonatal and perinatal mortality. Surveillance of high-risk pregnancies is also required.

KEYWORDS : Intrauterine Growth Restriction (IUGR), Fetal Morbidity, Neonatal Mortality, Neonatal Mortality, Perinatal deaths, Small for Gestational Age (SGA), Perinatal Asphyxia.

INTRODUCTION

Intrauterine Growth Restriction (IUGR), affects almost 10 % of pregnancy with raised risk of fetal and neonatal mortality and morbidity. The outcome of IUGR babies depend upon the factors which causes IUGR, baby weight if less than 3rd percentile and presence of doppler changes in Umbilical, Middle Cerebral Artery, uterine and ductus venosus. [1,2] Advances in the ICU setup and modern medications have increased the life expectancy of neonates born with lesser birth weight in recent years but the intrauterine demise remains the same. [3,4] Foetal growth restriction also contributes more to perinatal mortality.[5]

A "normal" neonate has a weight between the 10th and 90th percentile in the growth chart according to the gestational age, race and gender-associated differences. There are no signs of malnutrition or growth retardation. The phrases "IUGR" and "small for gestational age" (SGA) are commonly defined as birth weight less than the 10th percentile for that gestational age or two standard deviations below the population norms on the growth charts. Babies with IUGR have malnutrition at the time of birth as they have various maternal diseases and placental and foetal factors associated with it. SGA babies are constitutionally small and they don't have associated morbidities.

IUGR is classified into 3 types:

1. Asymmetrical IUGR (malnourished babies): Have mostly maternal factors associated with it like anaemia, pre-eclampsia, maternal malnourishment, uteroplacental insufficiency, which causes proper growth in the early foetal life but the trauma affects the growth in later foetal development. So, the main parameter affected are the Head circumference (HC) and abdominal circumference (AC), Biparietal diameter (BPD) and Femur length (FL) remains unaffected. It accounts for 70-80 % of IUGR. They have good prognosis.
2. Symmetrical IUGR (hypoplastic small for date): Foetus have main trauma during the early foetal life due to either maternal infection, foetal infection, foetal anomalies or chromosomal factors which affects the foetus in all parameters. It accounts for 20-30 % of IUGR. They have poorer prognosis.
3. Infants with mixed IUGR have a smaller number of cells and smaller cell size. They're typically found in poorer nations. At delivery, these neonates show clinical characteristics that are identical to both symmetrical and asymmetrical IUGR. Early IUGR is affected further by placental reasons in late pregnancy, such as placenta previa, abruption, or chorioangiomas, resulting in this kind of IUGR..[6]

SGA or Small for Gestational Age babies can be classified as:
Moderate: Weight of neonate between 3rd to 10th percentile of growth chart.
Severe: Birth weight below third percentile of growth chart. [7]

The present scenario of detection of IUGR during antenatal period is 25 to 36%. [8,9]The antenatal detection of IUGR helps to determine the high-risk pregnancy and the preventive strategy can reduce the stillbirths and neonatal morbidity and mortality. Prenatal detection of IUGR with timely intervention

and delivery helps to improve perinatal outcome. With the advances available in neonatal ICU and the medications, the lifespan of IUGR babies can be expanded with minimal morbidity. In pregnancies with a predefined IUGR, the probability of stillbirth is 1% (9.7% of 1,000 births). Stillbirth (SB) is eight times more likely in pregnancies with unexplained IUGR than in pregnancies without IUGR (19.8 versus 2.4/1,000 births). [7]. The goal of this study is to find out how common IUGR is in the study population, as well as the outcome of pregnancy in the hospital during the study time.

MATERIALS AND METHODOLOGY:

The current study looked at the risk variables for 100 individuals who had antenatal detection of foetal growth restriction in a periurban tertiary health care centre in Hingna, Nagpur.

Prospective Observational Study is the type of research used in this study.

Setting: A periurban tertiary healthcare hospital in Nagpur's obstetric unit.

The study took place from January 2021 to December 2021. (one year) 100 patients were included in the study.

Before beginning the study, the Institutional Ethical Committee of Datta Meghe Medical College, Nagpur, a sister concern of Datta Meghe Institute of Medical Sciences, Wardha, gave their clearance. Patients were explained the purpose of the study and as per their willingness, written, informed consent was taken. Data were collected from the patients who were followed up on Outpatient department basis and the admitted patients in the ward who were diagnosed as having intrauterine growth restriction.

Inclusion Criteria:

1. Booked patients of the hospital or Unbooked patients referred from other centres.
2. Patients were more than 28 weeks gestation confirmed by ultrasonography of first trimester or by surety of dates.
3. Patients with high risk factors like Pregnancy Induced Hypertension, Anaemia, Oligohydramnios, Placenta Previa and Diabetes Mellitus were included in the study.
4. Patients with a single pregnancy with IUGR with or without doppler changes.
5. Willing to be included in study.

Exclusion Criteria:

1. Patients with irregular previous menstrual history who were not sure of dates.
2. Prior history of taking OCPs, 3 months before conceiving.
3. Twins, triplets or multiple gestation.
4. Not willing to participate in study.

For a duration of 1 year, 100 cases were studied from January 2021 till December 2021. The relevant data of these patients including maternal age, socioeconomic status, parity, dietary history, history of infections in present pregnancy were noted. Menstrual history was noted and the period of gestation was confirmed by using Naegle's formula as well as from the Expected date of delivery from the first-trimester scan. Number of visits and follow up of patient were noted and the period of foetal growth restriction development were noted. Weight gain during pregnancy was noted. High-risk pregnancy with pregnancy-induced hypertension, diabetes mellitus, anaemia, and oligohydramnios was noted. In Maternal monitoring - A gravidogram was kept, which included a general evaluation of the mother, including weight, pulse, blood pressure, urine albumin, and weekly symphysio fundal height and abdominal girth measurements. In foetal monitoring, the mother was given a stringent Daily Foetal Movement Count (DFMC) to record the foetal movements after each of the three major meals for one hour, and a Non-Stress Test (NST) was performed twice daily. Serial ultrasonography was used to track the increase of the HC, BPD, FL, AC, and HC/AC ratio. Asymmetrical IUGR was defined as an HC/AC ratio greater than one. Serial USGs were performed to examine foetal development, AFI, and placental maturity, as well as Color Doppler and a Biophysical Profile. The decision to end the pregnancy was made based on the foetus's growth and well-being. The patient's birth method was chosen based on her gestational age.

RESULTS

1246 total deliveries in the study period of 1 year from Jan 2021 till Dec 2021 were recorded and 100 cases of IUGR were detected during this period. In the current study, incidence of IUGR was 8.02%. The percentage of IUGR was found to be more in age group of 21-25 years (51%). As far as socioeconomic condition was concerned, majority of the women were of low socioeconomic group (76%). Percentage of women out of 100 cases- primigravida- 67% and multigravida were 23 %. In comparison to the recommended cases (registered outside) and the unregistered, our hospital's booked cases with regular follow-up revealed higher mean birth weights of newborn.

Table no. 1: Association of IUGR with high-risk pregnancy.

Sr. no.	High risk	No./ Percentage
1.	Pregnancy Induced Hypertension	53
2.	Chronic Hypertension	4
3.	Anaemia	12
4.	Previous history of IUGR	9
5.	Malnutrition	6
6.	Placenta Previa	2
7.	Diabetes Mellitus	1
8.	Hypothyroidism	3
9.	Abortion in first trimester	2
10.	Anomaly in baby	1
11.	Heart Disease	2
12.	Idiopathic	5

Table no. 1: Pregnancy Induced Hypertension was the most common risk factor for IUGR, accounting for 53% of the cases, followed by anaemia (12%). Nine patients had previously had an IUGR pregnancy with recurring IUGR.

Chronic hypertension, hypothyroidism, heart disease (cardiomyopathy), malnutrition, bleeding PV in the first trimester, placenta previa, congenital abnormalities, diabetes mellitus, and idiopathic (no cause discovered) were other maternal risk factors for IUGR in the current study. It was discovered that symphysio-fundal height is a sensitive predictor of IUGR. Asymmetrical IUGR with an HC/AC ratio greater than 1 was found in 76 percent of patients ($p=0.000$). Grade 3 and 4 placental abnormalities were seen in 78 percent of instances, with 82 percent of those having been pregnant for more than 36 weeks. It was beneficial.

Table no. 2: Perinatal outcome associated with abnormal doppler findings:

Sr. No.	Doppler Findings	No.	Caesarean section	NICU Admission (LSCS and FTND)	Neonatal Complications (LSCS and FTND)
1.	Notch in Uterine Artery(A)	17	11	9	5
2.	Uterine Artery, increased S/D ratio (B)	12	9	6	3

3.	Umbilical Artery, increased S/D ratio (C)	16	13	7	4
4.	Absent Diastolic flow in Umbilical Artery (D)	7	7	4	2
5.	Reversal of flow in Umbilical Artery (E)	2	2	1	1
6.	Decreased S/D ratio in Middle Cerebral Artery (F)	3	3	2	1
7.	Normal	43	19	21	12
8.	Total	100	64	50	28

Table no.2: Shows the correlation of doppler changes and the outcome of deliveries in the form of LSCS or FTND, in case of doppler changes, NICU admission of babies in the following subtypes and neonatal complications associated with it.

Of the 100 patients admitted with IUGR, 43 women had normal doppler findings with only Low birth weight in scan and clinical findings of which 19 patients underwent LSCS and 24 normal vaginal deliveries. 21 babies of them were admitted in NICU mainly due to respiratory distress and low birth weight, and 12 of them had complications in the form of hyperbilirubinaemia. Two were detected with congenital heart disease which were missed in antenatal scan. 17 ANC patients had notch in uterine artery of which 11 underwent LSCS, 16 had raised umbilical S/D ratio with 13 undergoing LSCS, 12 had raised S/D ratio in uterine artery who were given trial of labour but 9 of them required emergency LSCS. 7 had absent diastolic notch in umbilical artery, 2 with reversal of flow in umbilical artery and 3 had decreased S/D ratio in umbilical artery all of them were not given trial of labour and taken for LSCS directly. Total NICU admissions were 50, out of which 28 had less birth weight and shifted for increase in weight and observation, 1 had cyanosis due to heart disease, 1 baby was anomalous both were intubated and shifted and rest of them had respiratory distress.

Table. No.3: Maternal complications in IUGR.

Sr. no.	Maternal Complications	No. (%)
1.	Anaemia	12
2.	Pregnancy Induced Hypertension	53
3.	Post Partum Haemorrhage	8
4.	Sepsis	6
5.	Eclampsia	3
6.	Peripartum cardiomyopathy	1

Table. No. 3, Shows the maternal complications seen in IUGR which included pregnancy induced hypertension as a significant cause 53 cases followed by anaemia in 12 cases. Those patients who landed up in post partum haemorrhage were 8. Patient who was near missed with eclampsia and post partum cardiomyopathy were 3 and 1. All the cases were managed with no maternal mortality and minimum morbidity. Foetal distress was commonest indication of caesarean section (33 cases, 51.5%) followed by abnormal doppler findings (17 cases 26.5 %) and oligohydramnios (in 27 cases 42.18%) along with or without doppler changes and foetal distress). In the current study, the majority of newborns (63%) had mild IUGR with birth weights between 1.5 and 2.5 kg, 32% had moderate IUGR with birth weights between 1 and 1.5 kg, and 5% had severe IUGR with birth weights less than 1 kg.

Table no. 4: Neonatal complications in IUGR babies.

Sr. no.	Neonatal Complications	No.
1.	Respiratory distress	8
2.	Birth asphyxia	2
3.	Hyperbilirubinaemia	13
4.	Hypoglycaemia	4
5.	Seizures	2
6.	Heart disease	2
7.	Sepsis	9
8.	Congenital anomaly	1

Table no: 4 shows the neonatal complications in IUGR babies. 13 had hyperbilirubinaemia requiring Phototherapy, 4 had hypoglycaemia of which 2 had seizures. 9 babies had sepsis requiring antibiotics. 8 had respiratory distress immediately after birth of which 2 had to be intubated. In Perinatal outcome, 2 babies expired, one due to congenital cyanotic heart disease and one due to anomaly. Rest all of them were discharged at various interval of period according to their weight gain and settlement of sepsis and raised bilirubin.

In the present study, 86% were asymmetrical IUGR and 14% had symmetrical IUGR.

DISCUSSION

Brodsky and Cristou had concluded in their study that IUGR affects 5-7 percent of people. The incidence of IUGR was determined to be 2.4 percent in Sharon and Gilberto's research of 5961 patients. The incidence of IUGR was 8.02 percent in a recent study of 100 patients out of 1246 births which is comparable to the study by Brodsky and Cristou. [8,9,10]

They also observed that the women younger than 20 years had more cases of IUGR. The age range of 21-25 years, which is the average age of marriage and reproduction in India, had the highest number of instances (51%) in the current study. [11]

In a study of 101 cases of IUGR and 202 controls, D. Acharya and K. Nagraj found that 44 (43.6%) cases were primigravida and 57 (33.7%) cases were multigravida. In this study, 67 percent of the women were primigravida and 23% were multigravida. [12]

In a study of IUGR in 124 instances, Rachdi R and Chlyah M discovered that 46.8% of the women were primiparous. Primiparity was revealed to be an important factor of IUGR by Ferraz et al in Brazil and Malvankar et al in their separate investigations. [13]

According to Visser et al, hypertension during pregnancy was the most common cause of IUGR in 59 percent of cases. In our study, 53 out of 100 individuals had hypertension, and three of them developed eclampsia, necessitating emergency LSCS.

In a study of 1364 SGA newborns, Dashe et colleagues discovered that 20% or 273, had asymmetrical IUGR, whereas the other 80% or 1091, had symmetrical IUGR. The asymmetrical IUGR was 86 percent in our study, while the symmetrical one was 14 percent. [14]

In their investigation, Sood et al discovered a percentage of LSCS of 35 percent in symmetrical IUGR and 29 percent in asymmetrical IUGR. In the current study, 64 percent of cases required Caesarean section, with foetal distress (33 cases, 51.5 percent) being the most common reason, followed by abnormal doppler findings (17 cases, 26.5 percent) and oligohydramnios (27 cases, 42.18 percent) with or without doppler changes and foetal distress. In the current study, the majority of newborns (63 percent) had mild IUGR and had a birth weight between 1.5 to 2.5kg, moderate IUGR babies with weight between 1 to 1.5 kg were 32% and babies with weight less than 1 kg in severe IUGR category were 5%.

Of the neonatal complications, 13 had hyperbilirubinaemia

requiring Phototherapy, 4 had hypoglycaemia of which 2 had seizures. 9 babies had sepsis requiring antibiotics. 8 had respiratory distress immediately after birth of which 2 had to be intubated. In Perinatal outcome, 2 babies expired, one due to congenital cyanotic heart disease and one due to anomaly.

CONCLUSIONS

Leading cause of perinatal and neonatal mortality and morbidity is still IUGR. It can be easily assessed at an early stage. The root cause being ignorance about medical care and lesser hospital visits. There should be sensitisation at the base level of anganwadi workers, ASHA workers and peripheral health centre sisters to sensitise pregnant women for booking at a proper centre with regular follow up during pregnancy. Providing them good dietary knowledge is also of utmost importance. Serial clinical, ultrasonographic and doppler follow up will help in diagnosing IUGR and decision making to avoid intrauterine demise, neonatal and perinatal mortality. Surveillance of high-risk pregnancies are also required.

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