Original Article

Risk Factors for Intrauterine Growth Restriction: 9 Years Analysis in Tertiary Care Hospital

A Shrestha, N Pradhan, B Kayastha

Department of Obstetrics and Gynecology, Dhulikhel Hospital, Kathmandu University Hospital

Abstract

Background: Intrauterine growth restricted (IUGR) fetuses are at higher risk of developing neonatal complications and also known to develop metabolic syndrome in adult life. So, an early antenatal detection, choosing the optimal time and method of delivery and intervention when required could minimize the risk significantly.

Objective: To find out the perinatal outcome and the maternal and placental risk factors.

Methods: A prospective study was conducted from January 2010 to January 2019, at a Teaching Hospital. A singleton pregnancy, above 28 weeks of gestation with clinical diagnosis of IUGR and confirmed by ultrasonography were included in the study. The statistical analysis was performed by Statistical Package of Social Sciences (SPSS) 23.0 software.

Results: Maternal risk factors like low pregnancy body mass index, preeclampsia, anaemia, hypothyroidism and placental factors like retroplacental hemorrhage were mainly responsible for intrauterine growth restriction.

Conclusions: The early identification of risk factors and management of the same antenatally is an important issue to prevent adverse perinatal outcomes associated with IUGR.

Keywords: Intrauterine growth restriction, maternal factors, perinatal outcomes, placental factors

Introduction

The definition of intrauterine growth restriction (IUGR) is a condition when a fetus has failed to achieve its genetically determined growth potential. According to American College of Obstetricians and Gynecologist and Royal College of Obstetricians and Gynecologist, IUGR means a pathological restriction of genetic growth potential.[1,2] The American College of Obstetricians and Gynecologists committee highlights that the distinction between pathological and normal growth is challenging in clinical practice.[3] Intrauterine growth chart has been an important tool to differentiate between small for gestational age fetuses and IUGR fetuses. IUGR fetuses are at higher risk of developing neonatal complications like fetal hypoxia, impaired neuronal development, neonatal ICU stay and neonatal mortality.[4,5] They are also known to develop metabolic syndrome in later adult life.[6] Approximately 3 - 8% of all infants born in developed countries have been identified as growth restricted.[7,8] An early antenatal detection, choosing the optimal time and method of delivery and intervention when required could minimize the risk significantly.[9]

Till now, there is not any study analyzing the risk factors for IUGR in Nepali context. So, the main aim of our study is to find out the perinatal outcome and the maternal and placental risk

Address for correspondence
Dr. Abha Shrestha
Department of Obstetrics and Gynecology
Dhulikhel Hospital, Kavre,
Email: abhaobgy@gmail.com

factors associated with intrauterine growth restriction amongst pregnant women.

Materials and Methodology

This was a prospective longitudinal study performed in Department of obstetrics and gynecology of a Teaching Hospital from January 2010 to January 2019. The ethical approval was taken from institutional review committee. The informed consent was taken from the patients for the study. The study population consisted of 365 pregnant women with IUGR. These women attended the antenatal clinic at Hospital Obstetrics Outpatient Department. The inclusion criteria were: singleton pregnancies, >28 weeks gestational age, clinically diagnosed IUGR, and confirmed by ultrasound when the abdominal circumference was less than 2 standard deviation (SD) from the mean value. Placental dysfunction was considered when the umbilical artery doppler S/D ratio ≥3 or those with absent end diastolic flow or reversed end diastolic flow. The exclusion criteria were: multifetal pregnancy and congenitally anomalous fetus. The risk factors for IUGR like low BMI, maternal anaemia, hypothyroidism, chronic hypertension, women on anticonvulsant therapy and previous history of delivering IUGR fetuses were taken into consideration.

A proforma was prepared with all the clinical details, laboratory data, ultrasonology and neonatal data. The outcome data were collected including the gestational age at birth, gender of the newborn, birth weight and APGAR Scores. Statistical analysis was performed using the Statistical Package of Social Sciences (SPSS) 23.0 software using frequency and percentage.

Results

There were total 33,750 deliveries in department of Obstetrics and Gynecology from January 2010 to January 2019. Among them, 365 were babies with IUGR. So, the frequency was found to be 1.08%.

In this study, out of 365 IUGR cases, 80 (21.9%) had low maternal basal metabolic index (BMI), 70 (19.2%) had anaemia and 35 (9.6%) had hypothyroidism as shown in figure 1.

The parity index in pregnant women with IUGR is as shown in figure 2.

The clinical examination revealed the symphysiofundal height of more >3cm less in 300 (82.2%) whereas >6cm less in 65 (17.8%) cases.

The ultasonological study revealed abdominal circumference of less than tenth percentile in all 365 cases.

Amniotic fluid index showed between 5-8cm in 190 (52.1%) whereas <5cm in 175 (47.9%) cases. Non stress test was non-reactive in 100 (27.4%) and deceleration in 30 (8.2%) cases.

Likewise, Doppler study showed the changes in umbilical artery in 240 (65.7%) cases.

The figure 3 showed the different modes of delivery in pregnant women with IUGR babies.

The table 1 showed the different perinatal outcomes in IUGR babies.

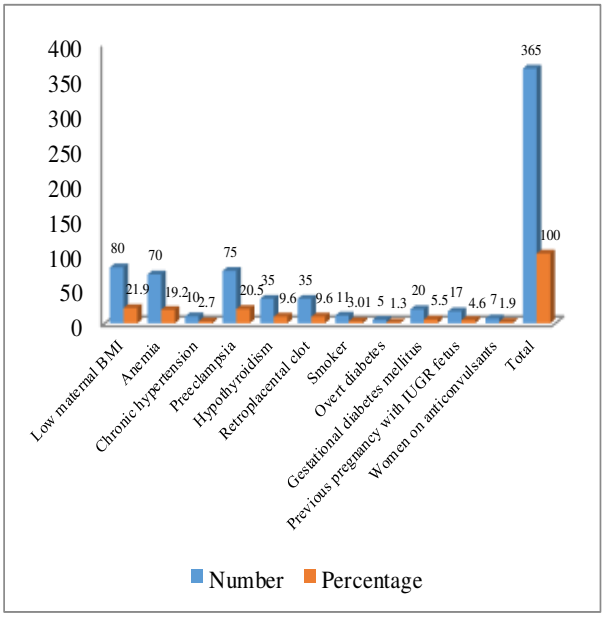

Figure 1: Antenatal risk factors amongst women with IUGR (n= 365)

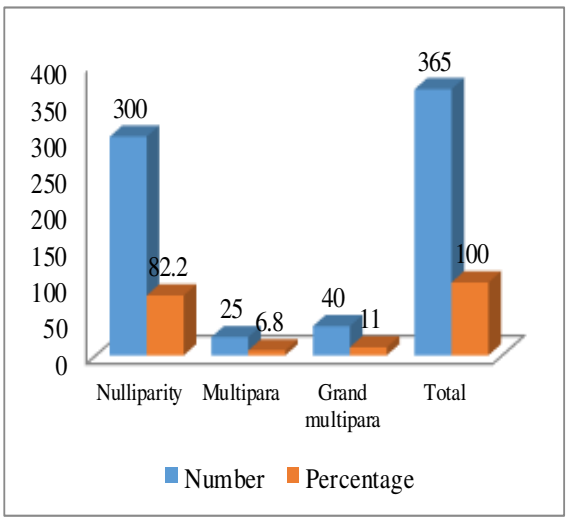

Figure 2: Parity index amongst women with IUGR (n= 365)

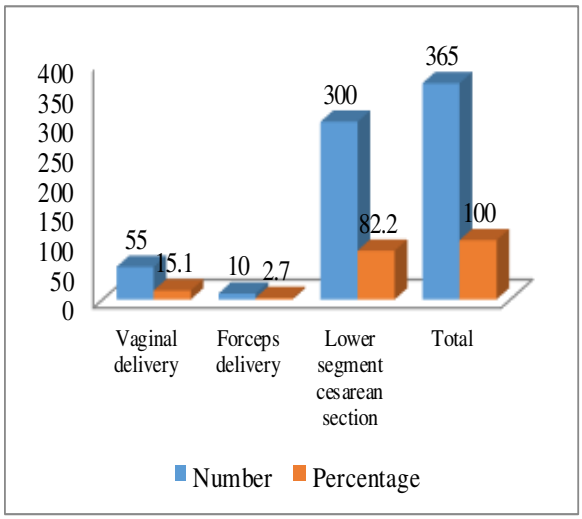

Figure 3: Mode of delivery amongst women with IUGR (n= 365)

Table 1: Perinatal outcome in IUGR babies (n= 365)

Perinatal outcome	Number	Percentage	Total
Baby weight			
<1kg	15	4.1	365 (100)
1kg- <1.5kg	60	16.4	
1.5kg- <2kg	190	52.1	
2kg- <2.5kg	100	27.4	
APGAR score			
<7	155	42.5	365 (100)
>7	210	57.5	
Post-delivery newborn status			
NICU admission	155	42.5	365 (100)
Perinatal death	20	5.4	
Kangaroo mother care by mother side	190	52.1	
Fetal outcome			365 (100)
Preterm delivery	165	45.2	
Term delivery	200	54.8	

Among the IUGR babies, 250 (68.5%) were female babies whereas 115 (31.5%) were male babies.

Regarding the perinatal mortality, it was more in fetuses with severe growth restriction and abnormal Doppler studies. Amongst 20 perinatal deaths, 15 were delivered by LSCS whereas 5 were vaginal delivery as they had come in active stage of labour.

Discussion

This risk factor analysis of IUGR babies of 9 year period is perhaps the first of its kind of study in our set-up. The frequency of IUGR in our study was 1.08% which is lesser than the studies performed in developed countries which ranged from 3-8%. The reason behind such a low frequency could possibly be high number of home delivery in our country.[7,8]

Our study showed that low maternal BMI was more in IUGR cases which is consistent with the other studies reporting low maternal BMI being associated with preterm delivery and IUGR.[10,11]

Our study also showed that anemia and hypertension in pregnancies like preeclampsia and chronic hypertension were significant risk factors in IUGR which is consistent with studies performed by different authors. The reason is placental insufficiencies.[12-14]

The relationship of hypothyroidism with IUGR had been proven in different literature and this was also true in our study.[15,16]

Our study showed that retroplacental hemorrhage was a significant risk factor in IUGR. The reason is placental insufficiencies leading to oligohydramnios and increased perinatal morbidity and mortality. We had also noticed that women who smoke are more likely to develop IUGR and it is consistent with other studies.[17]

Gestational diabetes mellitus and overt diabetes were significant risk factors in IUGR. Likewise, previous pregnancy with IUGR has significant risk in developing IUGR in corresponding pregnancy as in our study. The above findings were consistent with studies by different authors.[18-20]

In our study, out of 10 women on anticonvulsant therapy with carbamazepine, 7 developed IUGR. The reason could be side effects of drug and seizure itself.[21]

Our study showed that IUGR is more in nulliparous, the reason may be because of more nulliparous women in our study population. Our finding is somehow consistent with study performed by Saki et al.[15]

The green top guideline of Royal College of Obstetricians and Gynecologists recommends that serial ultrasound scanning is necessary from 26-28 weeks in women with IUGR, as clinical examinations like symphysiofundal height measurement and abdominal palpation has limited accuracy in identifying IUGR fetuses.[22] Perinatal death and longer neonatal intensive care unit (NICU) stay were among fetuses with abnormal umbilical artery Doppler and severe growth restriction and later these fetuses may develop metabolic syndrome in adulthood .[23]

Our study showed that there were more IUGR babies delivered through LSCS, the reason of high LSCS delivery is IUGR itself as it is a high risk case and this finding is consistent with other

observational studies which showed that detection of growth restriction may be associated with an increased incidence of obstetric interventions.[18] In our study, most of the fetuses delivered were with the birth weight of 1.5-2 kg. We observed that the APGAR score was >7 in most of the newborns as they were delivered by LSCS and there was a pediatrician during the delivery of IUGR fetuses for early intervention when required. One hundred and fifty five newborns required NICU admission for observation as they were prone to hypothermia and transient tachypnea.

We observed good perinatal outcome in our newborns because of vigorous monitoring and early identification of IUGR. Perinatal death in 20 fetuses were due to preterm delivery and weight less than 1.5 kg.

Our study showed that the female fetuses had more IUGR than male fetuses which is similar to other studies and there was not any definitive reason for it.[17,24]

So, it is important to timely deal with different issues like risk factors and perinatal outcomes in IUGR babies as it helps to improve the outcome.

The main limitation of our study is that it was a single institutional project. For the generalization of results, it is important to perform multi-institutional studies.

Conclusion

It is concluded that IUGR is an important cause of peri-natal morbidity and mortality. Some of the contributing factors like anemia, poor maternal nutritional and poor weight gain during pregnancy and hypertension during pregnancy can be prevented and detected early. Some of the causes of IUGR and subsequent fetal morbidity and mortality are preventable. Awareness among pregnant patients about nutrition, antenatal checkups are of upmost importance.

Conflict of interest: None.

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