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Original Research Article

Analysis of frequency and risk factors for intrauterine growth restriction

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ABSTRACT

Background: Intrauterine growth restricted (IUGR) fetuses are at greater risk of developing fetal hypoxia, neonatal complications, impaired neurodevelopment, and also neonatal intensive care unit stay and neonatal mortality. They are also known to develop metabolic syndrome in adult life. So, the main objective of this study was to find out the frequency of intrauterine growth restriction, to identify the maternal and placental risk factors associated with intrauterine growth restriction and its perinatal outcome amongst pregnant women attending the Obstetric Outpatient Department in Dhulikhel Hospital, Kathmandu University Hospital.
Methods: A prospective study was conducted from June 2011 to June 2017, at Dhulikhel Hospital, Kathmandu University Hospital, Kavre, Nepal. 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) 20.0 software.
Results: Maternal risk factors like preeclampsia, anaemia, low pregnancy body mass index and placental factors like retroplacental hemorrhage were mainly responsible for intrauterine growth restriction.
Conclusions: Antenatal risk factors responsible for IUGR are important for the management of IUGR pregnancies and to prevent adverse perinatal outcome.

Keywords: Intrauterine growth restriction, Maternal factors, Perinatal outcomes, Placental factors

INTRODUCTION

Intrauterine growth restriction (IUGR) can be described as a condition in which a fetus has failed to achieve its genetically determined growth potential. This definition excludes fetuses that are small for gestational age (SGA) but are not pathologically small. According to American College of Obstetricians and Gynecologist and Royal College of Obstetricians and Gynecologist, intrauterine fetal growth restriction implies a pathological restriction of genetic growth potential.[1,2] The American College of Obstetricians and Gynecologists committee highlights that the distinction between normal and pathological growth in clinical practice is challenging.[3] Intrauterine growth chart has been an important tool to differentiate between small for gestational age fetuses and IUGR fetuses. IUGR fetuses are at greater risk of developing fetal hypoxia, neonatal complications, impaired neurodevelopment, and also neonatal ICU stay and neonatal mortality.[4,5] They are also known to develop metabolic syndrome in 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. Umbilical artery doppler examination is accepted tool for the diagnosis of IUGR along with clinical assessment.[9]

Since the risk factors associated with IUGR and the perinatal outcome has not been studied previously in our setup. So, the main aim our study is to find out the frequency of intrauterine growth restriction, to identify the maternal and placental risk factors associated with intrauterine growth restriction and its perinatal outcome amongst pregnant women.

METHODS

The present study was carried out in Dhulikhel Hospital, Kathmandu University Hospital, Kavre, Nepal from June 2011 to June 2017. The study population consisted of 198 pregnant women with IUGR. These women attended the antenatal clinic at Dhulikhel Hospital Obstetrics Outpatient Department. The inclusion criteria were: singleton pregnancies, above the gestational age of 28 weeks, clinically diagnosed IUGR, 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.

A proforma was prepared with all the clinical details, laboratory data, ultrasonology data 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) 20.0 software using frequency and percentage.

RESULTS

There were total 18,442 deliveries in department of Obstetrics and Gynecology from June 2011 to June 2017. Among them 198 were babies with IUGR. So, the frequency was found to be 1.07%.

In this study, out of 198 IUGR cases 47 (23.73%) had low maternal basal metabolic index (BMI), 44 (22.23%) had hypertension (including chronic hypertension and preeclampsia) complicating pregnancy, 35 (17.7%) women with anaemia as shown in Table 1.

Amongst women with IUGR 167(84.3%) were nulliparous, 13 (6.6%) were multipara as shown in Table 2.

On clinical examination the symphysiofundal height was >3 cm less in 162(82%) and >6 cm less was observed in 37(18%) than the period of gestation. Ultrasound examination showed abdominal circumference was less than tenth percentile in all 198 cases. Amniotic fluid index was in between 5-8 cm in 114 (57.8%) and <5 cm in 84 (42.1%). Non stress test (NST) was non-reactive in 48 (24.30%) and deceleration in 17 (8.5%). Doppler studies showed changes in umbilical artery in 134 (68%).

Table 1: Antenatal risk factor amongst women with IUGR.

Antenatal risk factors	Number	Percentage (%)
Chronic hypertension	6	3.03
Preeclampsia	38	19.2
Anaemia	35	17.7
Overt diabetes	2	1.01
Gestational diabetes mellitus	12	6.06
Hypothyroidism	10	5.05
Previous pregnancy with IUGR fetus	9	4.54
Women on anticonvulsants	4	2.02
Low maternal BMI	47	23.73
Retroplacental clot	28	14.14
Smoker	7	3.52
Total	198	100

Table 2: Parity index amongst women with IUGR.

Parity index	Number	Percentage (%)
Nulliparity	167	84.3
Multipara	13	6.6
Grand multipara	18	9.1
Total	198	100

Table 3: Perinatal outcome amongst IUGR babies.

Perinatal outcome	Number	Percentage (%)	
Baby weight			**Total**
<1000gm	17	8	198 (100)
1000-1499 gm	43	22	
1500-1999 gm	79	40	
1999-244959	59	30	
Fetal outcome			
Preterm delivery	83	42	198 (100)
Term delivery	115	58	
APGAR score			
<7	96	48.4	198 (100)
>7	102	51.5	
Post-delivery new born status			
NICU Admission	96	48.4	198 (100)
By Mother Side with Kangaroo mother care	102	51.5	
Perinatal death	13	6.5	13 (6.5)

Gestational age at the time of delivery was more than 28 weeks in all fetuses. The perinatal outcome like birth weight of the IUGR babies (ranged from 758 grams to 2482 gm), fetal outcome, APGAR score, post-delivery new born status and perinatal death were as shown in

Table 3. The modes of delivery in women with IUGR were as shown in Table 4.

Table 4: Mode of delivery amongst women with IUGR.

Mode of delivery	Number	Percentage (%)
Vaginal delivery	49	24.7
Forceps delivery	7	3.6
Lower segment cesarean section	142	71.7
Total	198	100

Among the IUGR babies 115 (58%) were female babies and 83 (42%) were male babies.

The perinatal mortality was more in pregnancies with severe growth restricted fetuses and abnormal doppler findings. Amongst 13 perinatal deaths, 9 were delivered by LSCS and 4 were vaginal birth, as they had come in active stage of labour. Their birth weight was between 700-1400 gm.

DISCUSSION

In our study, the IUGR frequency was only 1.07% which is lower than the studies performed in developed countries which ranged from 3-8%. The reason behind this may be in our country still there is lots of home deliveries.[7,8]

In this study hypertension in pregnancy like preeclampsia and chronic hypertension were found to have significant and strong association with IUGR which is similar to the study by Valsa and Odegard.[10,11] Anaemia in pregnancy is a significant risk factor for IUGR which is consistent with study performed by Rondó et al[12] and Muniyar et al.[13] Overt diabetes and gestational diabetes mellitus were significant risk factor for IUGR and it is in harmony with findings from Valsa and Vambergue et al.[10,14] Many studies have shown the association of hypothyroidism with fetal growth restriction.[15,16] Our studies also showed that the IUGR is more in nulliparous and grand multipara which is similar to study performed by Saki et al.[15] Many other studies have also shown that a women with a history of previous pregnancy with IUGR has significant risk of developing IUGR in present pregnancy and also it a risk factor for adverse perinatal outcome.[16,17] A study by Kuno et al showed that it recurs but tends to become less severe, which we noticed in our study also.[18] In this study there were only 6 women on anticonvulsants and out that 4 women had IUGR fetus, though their birth weight was within 2000gm to 2130 gm. Studies by Osrin et al and Neggers et al showed that there is significant relationship between low maternal BMI and adverse fetal outcome like preterm delivery and IUGR which is consistent with this study.[19,20] Placental risk factors like retroplacental hemorrhage, accelerated villous maturation is significantly associated with IUGR and oligo-hydramnios and increased perinatal morbidity and mortality. The green top guideline of Royal College of Obstetricians and Gynecologist recommend that serial ultrasound scanning be performed from 26-28 weeks in women with IUGR, as clinical examination like abdominal palpation and symphysio fundal height measurement has limited accuracy in identifying IUGR fetuses.[21] Perinatal death and longer neonatal intensive care unit (NICU) stay were among fetuses with severe growth restriction and abnormal umbilical artery doppler.[22]

In our study we found that the female fetuses are more who developed IUGR like in a study by Radulescu et al.[23] The other study that was performed have shown strong relation between the fetal sex and IUGR, though it is not clear why IUGR is more prevalent amongst female fetuses.[24] We had also noticed that women who smoke during pregnancy are more likely to develop IUGR fetuses like in a study by Minerowicz-Nabzdyk et al.[23]

So, the IUGR and its different risk factors are very important issues to deal with. The main limitation of our study is only single institutional study. The result will be more broad and also more applicable if we do the multi-institutional tertiary health centre study.

CONCLUSION

From the study, it is concluded that IUGR is an important cause of perinatal morbidity and mortality. In the present study, commonest maternal cause for IUGR was low maternal body mass index and pregnancy induced hypertension. The other contributing factors were anemia, and retroplacental hemorrhage. So, the antenatal risk factors responsible for IUGR are important for the management of IUGR pregnancies and to prevent adverse perinatal outcome.

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