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Outcomes of Neonates in Pregnancies with Intrauterine Growth Restriction in Developing Countries: A Cross-sectional Study Over a Period of 6 Months

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Abstract

Background: Intrauterine growth restriction (IUGR) in developing countries is a major health problem. Maternal risk factors play a huge role in causing IUGR, many of which are preventable or modifiable.

Aim: To find out the risk factors and outcomes of IUGR infants in pregnant women coming for delivery in a developing country.

Method: A cross sectional observational study was conducted at the department of Obstetrics and Gynaecology, Assam Medical College and hospital from July 2016 to December 2016. IUGR was diagnosed clinically by a lag of 4 weeks between actual gestational age and uterine fundal height. Total of 200 pregnant women with IUGR coming for delivery were included. Information regarding occupation, gestational age, maternal risk factors, mode of delivery and neonatal outcome were recorded on predesigned proforma. Mothers were followed up till delivery and neonates were followed up till discharge or death.

Results: Out of 200 clinically diagnosed pregnancies with IUGR, 148 neonates were IUGR as per Fenton's Growth Chart, significant risk factors for IUGR were gestational hypertension ($p=0.0001$), anaemia ($p=0.0001$), ethnicity ($p<0.05$). Our method of clinically selecting patients was highly accurate ($p<0.05$) when compared with birth weight as per Fenton's chart. Of 143 IUGR neonates, 6(4%) were still born, 10(6.7%) had died at birth due to resuscitation failure, 45(30%) had sepsis while 70(47%) needed NICU admission for some morbidity.

Conclusion: As anaemia and gestational hypertension being the prime and treatable causes of IUGR, proper antenatal care would be the key to reducing the IUGR burden in our setup.

Keywords: Intrauterine growth restriction; Gestational hypertension; Anaemia; Malnutrition

Introduction

Intrauterine growth restriction (IUGR) is defined as birth weight less than 10th centile for gestational age [1]. IUGR is noted to affect 10-15% of pregnant women [2]. Estimation of fetal weight is heavily influenced by paternal race, fetal gender, genetic influences, maternal Body Mass Index (BMI) and altitude [3,4]. Maternal factors such as low socioeconomic status, under nutrition,anaemia,chronic illness, teenage pregnancies [5], short interpregnancy interval [6], previous IUGR births [7-12] and inadequate prenatal care predispose to complications from fetal growth restriction [3,4]. Comprehensive management of these conditions may prevent perinatal complications. IUGR or small for gestational age (SGA) are at increased risk of perinatal morbidity and mortatlity.They also have higher rates of physical, neurological and mental impairment than babies with appropriate growth (AGA). IUGR is observed in 3-7% of the newborns and approximately thirty million babies worldwide suffer from IUGR every year. Nearly 75% of all affected babies are born in Asia [4]. Limited data is available in the North East part of India. The aim of this study is to determine various risk factors and outcomes of babies diagnosed to have IUGR.

Materials and Methods

The study was conducted at the department of Obstetrics and Gynaecology, Assam Medical College and Hospital, Dibrugarh, Assam from July 2016 - December 2016. A total of 200 patients were included in the study who presented to the labour room for delivery with pregnancies between 28-42 weeks and found to have IUGR. We used the clinical criteria of a lag of 4 weeks between the actual gestational age and uterine height to diagnose IUGR. The gestational age was determined using a combination of last menstrual period and 1st trimester ultrasound. The reason for choosing a clinical method of cases was that ultrasound machines are not widely available in the remote areas. Weight of baby was measured at the time of birth and detailed examination of each baby was carried out by a paediatrician. Babies were categorised as AGA, SGA and IUGR based on Fenton's Growth Chart. The babies were followed up till the day of discharge.

Informed consent was taken from participants enrolled in the study. A predesigned proforma was filled for each mother at the time of admission to collect information about various risk factors responsible

for IUGR. Postnatal weight and height were used to calculate body mass index (BMI). Gestational hypertension, anaemia, gestational diabetes were identified based on previous records or investigations done after admission. Hypertension is diagnosed when systolic blood pressure exceeds 140 mm Hg or diastolic blood pressure exceeds 90 mm Hg.

WHO definition for diagnosis of anaemia was used (Haemoglobin <11 gm/dl). Diabetes was defined as carbohydrate intolerance of variable severity with onset or first recognition during pregnancy. Oligohydramnios is diagnosed either clinically or if the amniotic fluid index (AFI) is below 5 cm. Normal AFI was 5-25 cm amd polyhydramnios was AFI >25 cm. Previous history of IUGR, preterm births and bad obstetric history was recorded.

Results were tabulated and computed. For qualitative variables Chi-square test was used and t-test for quantitative variables and $p<0.05$ was considered significant.

Results

Total 200 patients were taken. Tea garden workers accounted for 43% cases. A total of 147 patients were found to be primigravida. Undernourished women (BMI <18.5) was a significant factor (p-0.000013) in IUGR causation. Teenage pregnancies accounted for 7 cases and elderly gravida >35 years accounted for 9 cases. A significant past history was seen in 22 cases (11%) cases. Oligohydramnios ($p<0.0001$) was found in 134 cases. Among maternal diseases anaemia (p-0.0001), gestational hypertension (p-0.0001) were found to extremely statically significant risk factors. Twin gestation was seen in 25 cases (p-0.01).

We found tea garden workers, obesity, diabetes not to have a statically correlation with IUGR. 48 cases (24%) had no maternal risk factors identified showing that a major section of IUGR are idiopathic having no cause. Pregnancies lesser than 34 weeks gestations were given a course of betamethasone for fetal lung maturity. Mode of delivery was LSCS in 32 cases (21%), spontaneous vaginal delivery in 110 cases (74%) and induction of labour was done in 2 cases.

A total of 216 babies were delivered. Males accounted for 118 cases (54%). Following delivery we found 156 cases (72.2%) to have IUGR, 27 cases (12.5%) to be constitutionally small (SGA) and 33 cases to be appropriate for gestational age (AGA) (15%).

Hence the clinical method of using a lag of 4 weeks between the actual gestational age and uterine height was accurate. Of the IUGR babies 10 cases had resuscitation failure, 6 babies were stillborn, 69 babies were healthy and 71(45%) cases were shifted to NICU in view of better care. Of the NICU shifted babies, 15 babies (21%) exspired, 27(38%) cases were discharged against medical advice due to the patients unable to afford further care and 29(40%) babies recovered eventually and were discharged home. Sepsis was seen in 45 cases (p-0.014), neonatal jaundice in 35 cases (p-0.0143) and respiratory distress including birth asphyxia was seen in 16 cases (p-0.04) were significantly associated with IUGR babies (Figures 1-11) (Tables 1 and 2).

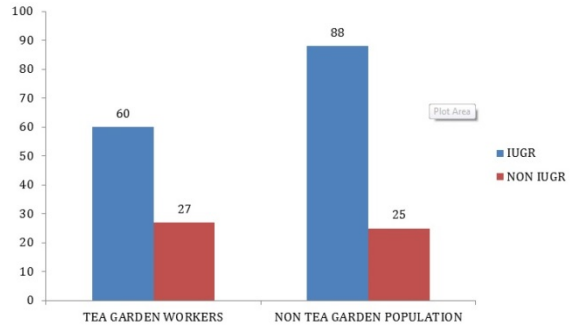

Figure 1: Proportion of IUGR and non IUGR babies in tea garden workers and general population.

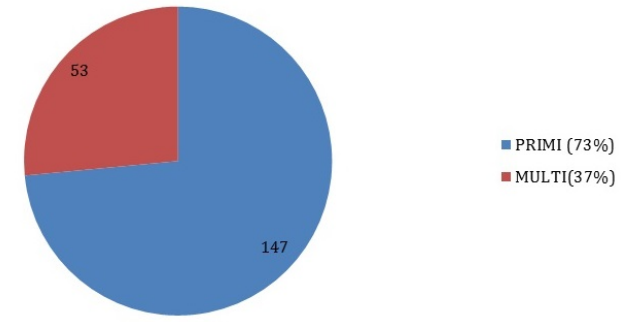

Figure 2: Relation of parity and IUGR diagnosed clinically.

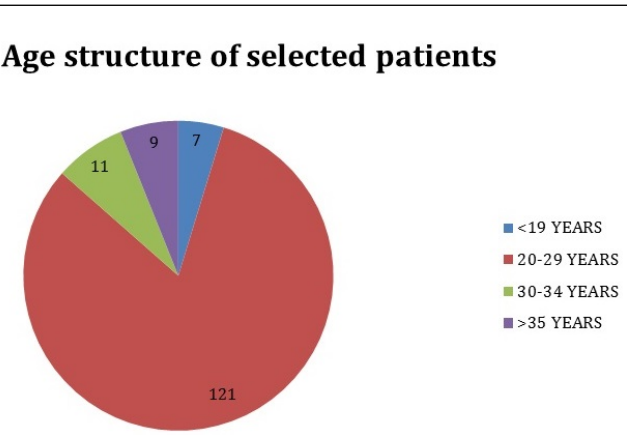

Figure 3: Age structure of selected population.

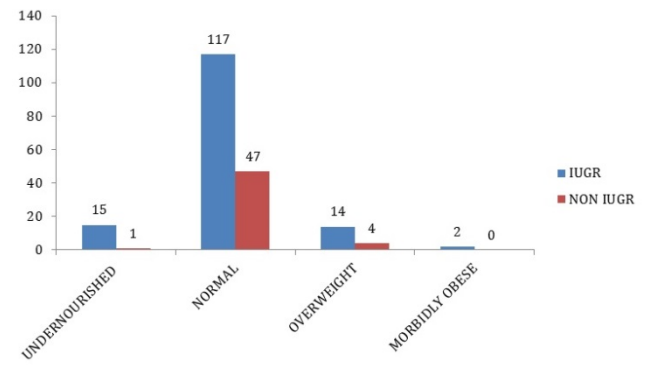

Figure 4: BMI based categorisation of patient population.

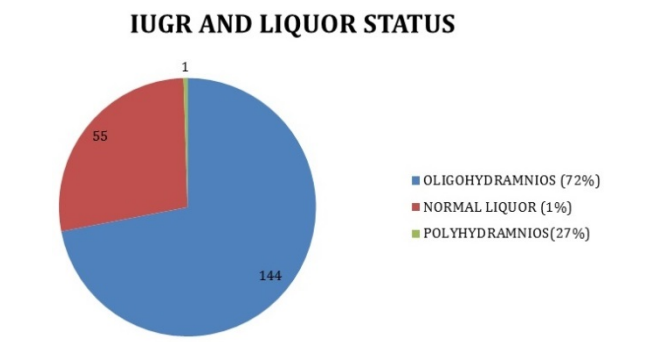

Figure 5: Relation between IUGR and liquor status.

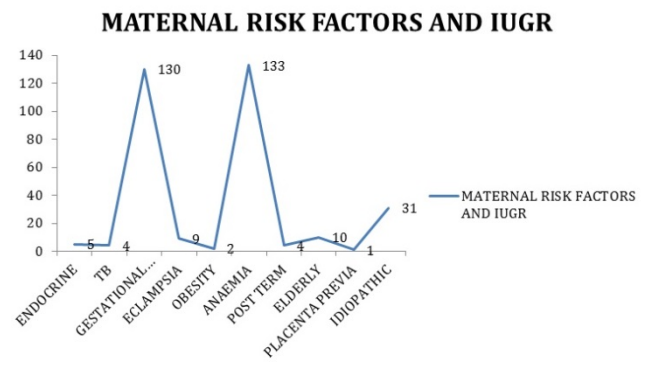

Figure 6: Relation between maternal risk factors and IUGR.

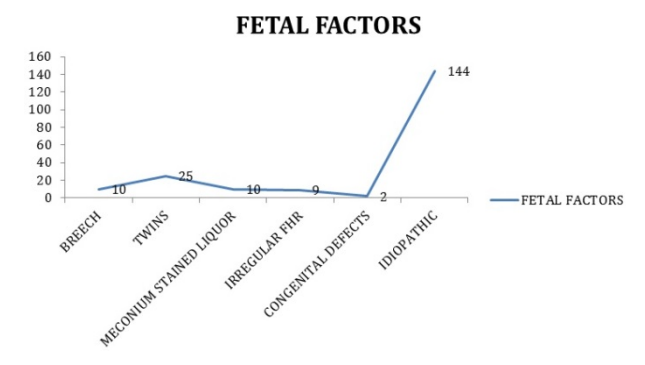

Figure 7: Relation between fetal factors and IUGR.

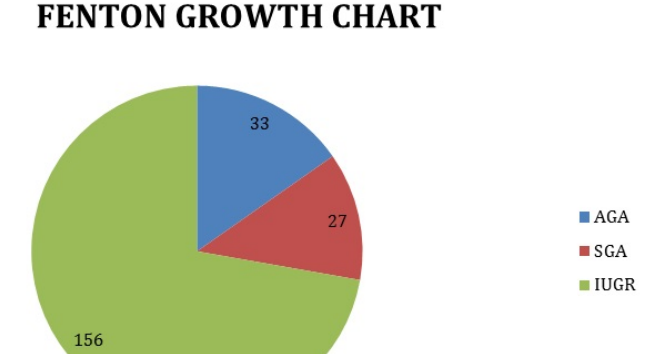

Figure 8: According to Fenton Chart proportion of babies found to be IUGR/SGA/AGA.

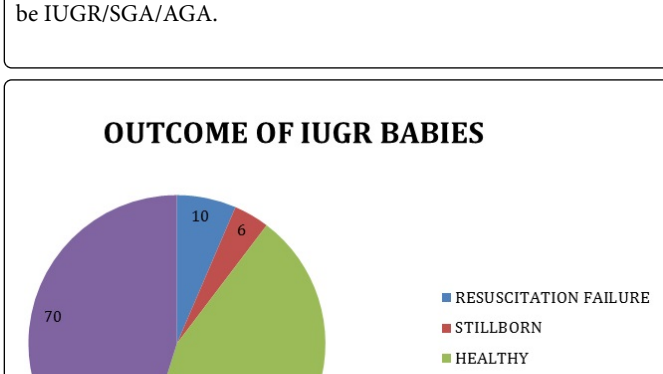

Figure 9: Outcome of IUGR babies.

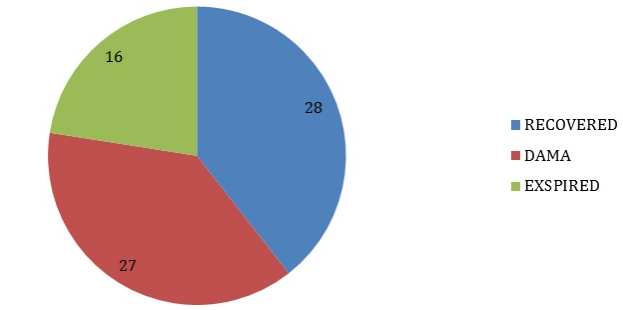

Figure 10: Outcome of NICU shifted babies.

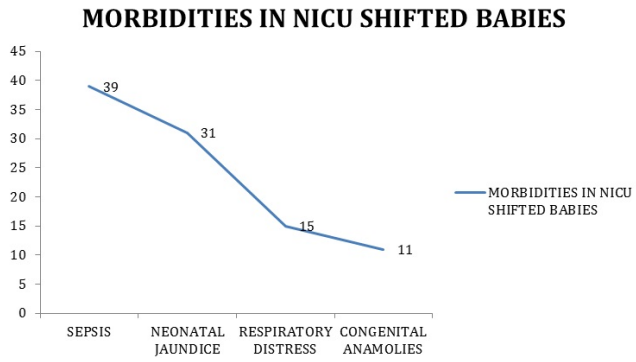

Figure 11: Morbidities of babies who were shifted to NICU.

Maternal risk factors	No cases	P value	Statistical significance
Undernourished (BMI<18.5)	46	0.000013	Extremely statically significant
Obesity(BMI>24.9)	20	0.2125	Not statically significant
Primiparity	147	0.0003	Extremely statically significance
Anaemia	133	<0.0001	Extremely statically significant
Gestational hypertension	117	<0.0001	Extremely statically significant
Eclampsia	9	0.11	Not significant
Diabetes	1	1	Not significant
Tuberculosis	4	0.57	Not significant
Oligohydamnios	134	<0.0001	Extremely statically significant

Table 1: The statically significance of various maternal risk factors.

Fetal factors	Cases	P value	Significance
Twins	25	0.01	Statically significant
Breech	10	0.02	Statically significant
Still born	12	1	Not statically significant
Resuscitation failure	13	0.11	Not statically significant
NICU shifted	71	0.0001	Extremely significant
Sepsis	45	0.014	Statically significant
Neonatal jaundice	35	0.0143	Statically significant
Congenital anomalies	14	0.76	Not statically significant
Respiratory distress Inc. BA	16	0.04	Statically significant

Table 2: The statically significance of various fetal factors.

Discussion

In the present study we observed anaemia and gestational hypertension to be the major causes of IUGR in our study population. Earlier study by Taj et al. [8] also showed gestational hypertension to be a significant risk factor in Asian population [8]. Maternal malnutrition was shown to be associated with IUGR like in prior study by Taj et al. [8]. Anaemia was found to be a significant risk factor by Radhakrishna et al. [9]. Primiparity was consistently associated with IUGR as shown in earlier studies by Taj et al. [8], Thompson et al. [10] and Fikree et al. [16]. Young maternal age as a risk factor was found in studies conducted by Jamal et al. in Pakistan and Ferraz et al in Brazil [11,12]. In our study we observed majority of women to belong to the age group of 20-29 years. Hypertension during pregnancy is a proven factor causing growth restriction [11,13-15]. In addition regular antenatal visits are necessary to pick up the IUGR cases early enough for appropriate interventions [11].

Studies have reported that average birth weight is lower among the poorer section of any society [14,17]. This is further supported by study done by Patricia HC et al. in Brazil [18]. Placenta previa as a risk factor is reported in literature although Mavalankar et al [16] did not report its significance. In our study placental abnormalities were not associated with IUGR. Tea garden workers an endemic section belonging to a poor social class accounted for 43% cases in our study. Maternal malnutrition and uteroplacental insufficiency are causes for asymmetric IUGR while congenital infections acquired early in pregnancy have association with symmetric IUGR [9,16-18]. A prior history of IUGR was found in a significant proportion of the population. Major neonatal morbidity and mortality was seen in IUGR babies. Sepsis accounted for maximum morbidity in NICU shifted babies.

Our study has some limitations as it is performed in developing countries. Lack of proper antenatal records and Ultrasound monitoring has proved to be a hindrance in proper patient management. Since the study included patients already presenting in labour not many interventions could be done. However, our clinical criteria of selecting patients were commendable due to it's cost effective nature.

Despite our limitations, the study gives a good insight into the causes of IUGR and the health burden placed in the North Eastern states of India. Since anaemia and gestational hypertension have been found to be the major treatable and preventable risk factors, proper antenatal care and aggressive management of this population can improve the outcome of pregnancy. The above findings need to be supported by further studies to quantify the risk factors over a longer study period.

Conclusion and Recommendations

We recommend both short term and long term interventions. Short term interventions include proper referral services and transport facilities from the peripheries to district hospitals as most of the cases presented late in pregnancy due to lack of proper health facilities at grass root level. Proper nutrition supplementation and economic upliftment of the tea garden workers who contribute to a significant section of the population are needed. Education of patients about proper inter pregnancy interval and family limitation are also necessary. Long term goals include proper training of health care workers in periphery sectors. Compulsory antenatal check-up including ultrasound monitoring at prescribed visits would go a long way in preventing IUGR health issue.

Conflict of Interest

There is no conflict of interests.

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