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Risk factors of intrauterine growth restriction in term pregnancy

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Abstract

Fetal growth restriction (FGR) is a pathological condition in which a fetus has not achieved his genetic growth potential, regardless of fetal size [(1)] Worldwide FGR is observed in about 24% of newborns; approximately 30million infants suffer from FGR every year. The burden of FGR is concentrated mainly in Asia which accounts for nearly 75% of all affected infants. National neonatal perinatal database of India reported the incidence of FGR to be 9.65% among hospital born live birth infants. Study was conducted for all cases with clinical/ Sonological term FGR admitted under department of OBG. A detailed history as per questioner will be taken with general physical examination and investigations will be done as per requirement. The accumulated data was evaluated and statistically analyzed. In the present study 70 patients with term gestation with FGR were recruited. Maternal (74.28%) was the commonest cause followed by Idiopathic (11.43) and Placental (10%) and Fetal (4.29%) causes. Among Maternal causes Pre Eclampsia was found to be in 50% cases. Most of the patients (50.7%) required caesarean section. A total of 9 (12.86%) neonate had birth weight of <1.5 kg, 48.6% had Birth weight between 1.6 to 1.9kg, 38.5% had birth weight between 2-2.4kg and 95.8% had asymmetrical FGR, 4.2% were symmetrical. 26 (40%) neonates had morbidity with 17(24.3%) neonatal mortality with Respiratory distress syndrome (41.18%) being most common cause. No Maternal Mortality.

Keywords: Disease, FGR, morbidity, mortality, perinatal, placenta, pregnancy

Introduction

The term intrauterine growth restriction (FGR) is replaced by Fetal Growth Restriction (FGR). The term intrauterine growth restriction (IUGR) is replaced by Fetal Growth Restriction (FGR). Fetal Growth Restriction is a pathological condition in which a fetus has not achieved his genetic growth potential, regardless of fetal size. FGR is caused by multiple adverse effects on the Fetus. FGR and SGA (Small for Gestational Age) has been used interchangeably, although related they are not synonymous. SGA describes an Infant whose weight is lower than population norms or lower than a predetermined cut off weight. SGA infants are defined as having a birth weight below 10th percentile for Gestational Age or >2

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S.D below the mean for Gestational Age. It is important to understand that a fetus does not need to be small to be growth restricted. It is estimated that the majority of FGR fetuses are SGA, while 50-70% of SGA fetuses have grown appropriately but are constitutionally small [1, 2].

Fetal growth is regulated at multiple levels therefore successful placentation is mandatory for coordination between Maternal, Fetal, and Placental components. Several conditions that may interfere with normal placentation lead either to pregnancy loss or FGR. Causes of FGR are broadly categorized into Maternal, Placental and Fetal causes. Maternal cause could be due to placental vascular insufficiency like Pre-eclampsia, Chronic HTN, Chronic Renal Diseases etc., or it may be due to Malnutrition, Smoking, Alcohol intake etc. Placental cause includes cases of poor uterine blood flow to placental site for a long time leading to chronic placental insufficiency with inadequate substrate (Glucose, Amino acid and Oxygen) transfer as in Placenta previa, Placental infarct, circumvallate placenta, Chorioangiomata or Velamentous cord insertion [2-4]. Fetal cause is when there is substrate in the maternal blood which crosses the placenta but is not utilized by the fetus like in Chromosomal anomalies (trisomy 13/18/21) or Congenital malformations (cardiovascular disease, renal disease) [3, 4].

Historically, FGR been categorized as symmetrical or asymmetrical depending on onset or etiology of a particular fetal insult. Symmetrical, in which newborn is symmetrically small and have normal head to abdomen and femur to abdomen ratio due to early fetal insult resulting in relative decrease in cell number and size. Asymmetrical, in which head and long bones are spared compared to abdomen and viscera due to late pregnancy insult with preferential shunting of oxygen and nutrients to brain resulting in Brain sparing effect. The fetal brain is normally relatively large and the liver relatively small. Because of brain-sparing effects, asymmetrical fetuses were thought to be preferentially protected from the full effects of growth restriction [5].

FGR lead to multiple complications either during Antenatal, Intranatal or Postnatal period. It is associated with increased perinatal mortality and morbidity. During Antenatal period there is risk of Chronic Fetal Distress and even Fetal Death. During Intranatal period there may be Meconium Aspiration Syndrome, Asphyxia, RDS, Hypoglycemia, Hypothermia, Bronchopulmonary Dysplasia, Hyper viscosity-thrombosis. Late complications may include increased risk of Metabolic Syndrome in adult life, Obesity, Hypertension, Diabetes, CHD. The morbidity associated with the FGR of those that are born alive can cause short, medium and long-term problems, and predisposes to the development of a great proportion of chronic disease in adult life [6].

Therefore, FGR has important implications not just for the fetus, baby, child and adult, but also for parents, careers and society. Having kept in view the above presentation, the present study was undertaken in order to find out the prevalence of FGR among high risk mothers and its causal relationship associated with various high risk factors and its fetomaternal outcome.

Methodology

Study design

- A Prospective Observational study of all term pregnant women with FGR admitted to Department of OBG.

Study setting

- Department of Obstetrics and gynecology

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Inclusion criteria

All Term Pregnant women with FGR admitted in Department of OBG.

Exclusion criteria

- Preterm (gestation <37 completed weeks).

Method of collection of data

- Study was conducted for all cases with clinical/ Sonological term FGR admitted under department of OBG.
- A detailed history as per questioner will be taken with general physical examination and investigations will be done as per requirement. The accumulated data will be evaluated and statistically analyzed.

Following investigations were done

- CBC.
- Urine routine, urine culture and sensitivity.
- RBS.
- LFT.
- RFT.
- LDH, Uric acid.
- Ultrasound with Doppler study.
- TORCH investigations, HPE of placenta, Neonatal autopsy (if needed).

Sample size

Sample size was calculated at 95% Confidence Level = 68, by rounding off, the final sample size considered is 70.

Results

Table 1: Distribution according to risk factors

Risk Factors	Frequency (n=70)	Percentage
Maternal risk factors	52	74.28%
Idiopathic	8	11.43%
Placental risk factors	7	10%
Fetal risk factors	3	4.29%

In our study, out of total 70 cases recruited. Maternal risk factors were noted in 52(74.28%) cases, followed by Idiopathic in 8(11.43%) cases, followed by placentalrisk factors in 7(10%) cases and fetal risk factors in 3(4.29%) cases.

Table 2: Distribution according to maternal risk factors

Maternal Risk Factors	Frequency (n=52)	Percentage
Pre Eclampsia	26	50%
Maternal SGA	14	26.92%
Maternal SGA with PE	6	11.53%
APH	4	7.69%
Pre Eclampsia with GDM	2	3.85%

The above table describes various maternal risk factors associated with FGR (52 cases). Among which Pre Eclampsia being the most common cause which accounts for 50% followed by Maternal SGA in 26.92% cases followed by APH in 11.53% cases and Pre Eclampsia with GDM in 3.85% of cases. In present study other maternal risk factors like renal diseases, maternal asthma, and maternal infections were not encountered.

Table 3: Fetal risk factors

Fetal Risk Factors	Frequency (n=3)	Percentage
Congenital Anomaly	2	66.67%
Multifetal Gestation	1	33.33%

Among various risk factors for FGR, fetal risk factors were found in 3 cases among which congenital anomaly was found in 2(66.67%) cases and Multifetal gestation in 1(33.33%).

Table 4: Distribution according to placental risk factors

Placental risk Factors	Frequency (n=7)	Percentage
Placental infections	3	42.86%
Abruptio Placenta	2	28.57%
Placenta Previa	2	28.57%

Among placental risk factors which were found in 7 cases, placental infections were found in 3(42.86%), abruptio placenta was found in 2(28.57%) of cases and Placenta Previa was found in 2(28.57%) cases.

Discussion

FGR can be defined as birth of an infant at weight which is less than its genetic potential. It encompasses a heterogeneous group of conditions which result in failure of fetus to achieve its genetic potential for growth prenatally. This condition includes inadequate placental function and fetal abnormalities. The prevention of low birth weight was public health priority in many developing countries where the condition was largely attributable to FGR as compared to prematurity. Consequently it became a challenge to obstetrician to optimize the outcome of these high risk infants by identifying its causes and severity and when inadequate growth occurred.

Resnik *et al.* [7] found that maternal vascular disease, with its associated decrease in uteroplacental perfusion, was believed to account for 20-30% of all FGR infants. In a population based study done by Gilbert *et al.* [8], found that the incidence of chronic hypertension was 0.69% (29,842) with increased neonatal morbidity along with FGR. Mazor-Dray *et al.* [9] included 199,093 deliveries where 4742 (2.3%) had UTI during pregnancy and delivery, found that patients with UTI had significantly higher rates of FGR, pre-eclampsia, CD and pre-term deliveries (either before 34 weeks or 37 weeks of gestation). Several studies had shown that women who had an FGR infant in a previous pregnancy had an increased risk of delivering an FGR infant in the next pregnancy. The rate of recurrence was believed to be nearly 20 percent. In the present study, most significant maternal risk factor observed was Pre Eclampsia in 26 (50%). Maternal SGA accounted for 14 (26.92%), APH in 4 (7.69%), Pre Eclampsia complicated with GDM in 2 (3.85%), Previous history of FGR in 7 (10%) of cases.

According to Alferivic *et al.* [10], placental factors like abruption and placenta previa might be associated with FGR, though other risk factors like HTN and thrombophilia might be associated. In the present study, 7(10%) cases was attributed by placental factors out of total 60 cases of FGR, where 3(42.86%) were due to placental infections, 2(28.57%) were due to

placenta Previa and 2(28.57%) was due to Abruptio Placenta.
Lin *et al*. [11] had 15-50% FGR due to fetal cause. In their study, there were 7% of FGR was due to chromosomal abnormalities and fetal infection were seen in up to 10% of all FGR. Grivell *et al*. [12], opined that CMV in pregnancy causes fetal damage throughout pregnancy causing FGR even without maternal illness indicating need for screening CMV infection in pregnancy. In the present study, Fetal causes attributed to 3(4.29%) of cases of FGR of which fetal congenital malformation noted in 2 (66.67%) and Multifetal gestation accounted for 1 (33.33%) of cases of FGR.

Conclusion

FGR is still a challenge to Obstetrician and the society at large due its problems related to its prevention, diagnosis, and its management. The study observed significant association of FGR in women in younger age and parity. Most of them were from poor socioeconomic background and engaged in heavy manual agricultural works. Among the various risk factors, maternal HTN with pregnancy, and placental causes were the predominant cause for the FGR in the present study.

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