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EARLY ASSESSMENT OF INTRAUTERINE GROWTH RETARDATION WITH FETAL BIOMETRIC PARAMETERS ASSESSED ON ULTRASONOGRAPHY

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ABSTRACT

Background: A fetus with Intrauterine Growth Retardation (IUGR) is at high risk of adverse outcomes in the perinatal region, and a growth retarded fetus does not reach growth potential.

Aims: The present prospective clinical study was conducted to attain the early assessment of IUGR (intrauterine growth retardation) with fetal biometric parameters using ultrasonography.

Method: In 50 females antenatal scan was done with ultrasonography and included subjects with singleton pregnancy in 28-30 weeks of gestation were assessed in the present study.

Result: Uterine artery ED notch was seen in 8% (n=4) study subjects, umbilical artery resistance Index was normal in 82% (n=41) study subjects, umbilical artery S/D (systolic/diastolic) ratio was normal in 82% (n=41) study subjects, uterine artery resistance index on the right side was normal in 84% (n=42) study subjects, whereas, on the left side, uterine artery RI was normal in 78% (n=39) study subjects. On color doppler assessment, uterine artery SD was normal in 84% (n=42) study subjects on the right side, and in 88% (n=44) subjects on the left side in subjects showing IUGR

Conclusion: The present study concludes that to accurately predict IUGR, femur length, abdominal circumference, and its correlation with head circumference are good indicators. Outcomes in pregnancies can be ascertained with a critical assessment of fetal and maternal charts.

Keywords: Intrauterine growth, IUG Retardation, Fetal parameters, Ultrasonography

INTRODUCTION

One of the most important and common complications seen during pregnancy is intrauterine growth retardation (IUGR). A fetus with IUGR is at high risk of adverse outcomes in the perinatal region and, and a growth retarded fetus does not reach growth potential. An intrauterine growth-restricted fetus as defined by the American College of Obstetricians and Gynecologists (ACOG) is a fetus with weight below the 10th percentile of its respective gestational age.[1]

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Despite various advancements in the field of Obstetrics and Gynaecology, IUGR poses a great challenge in developing countries like India, especially in developing countries like India with a high incidence of nearly 30 million per year. IUGR is associated with significant morbidity and mortality with long-term potential complications for a lifetime including cardiovascular disorders, neurodevelopment disability, meconium aspiration hypoglycemia, and/or pneumonia. Perinatal mortality in IUGR subjects is significantly high reaching nearly 3.6%.[2]

Various etiologic factors are associated with IUGR leading to placental insufficiency including fetal chromosomal anomaly, viral infections, alcohol and drug abuse, poor nutrition, collagen vascular disease, renal disease, and hypertension secondary to these maternal disorders. In well-nourished and healthy mothers, the prevalence of IUGR is nearly 3-5% which drastically increase in mothers with a previous history of IUGR and hypertension with an incidence as high as 25%.[3]

IUGR (Intrauterine growth restriction) also known as fetal growth restriction is usually diagnosed on ultrasonography and commonly describes fetal weight less than 10 percentile of gestational age as defined by ACOG (American College of obstetrics and gynecology). Associated features with IUGR are decreased organ weights, loss of adipose tissue and muscle mass, decreased head circumference and decreased length.[4] The present prospective clinical study was conducted to attain the early assessment of IUGR (intrauterine growth retardation) with fetal biometric parameters using ultrasonography.

MATERIAL & METHODS

The present prospective clinical study was conducted to attain the early assessment of IUGR (intrauterine growth retardation) with fetal biometric parameters using ultrasonography. The study assessed subjects visiting the Department of Radiodiagnosis, Nalanda Medical College, Patna, Bihar. The study population was comprised of the subjects referred from the Department of Obstetrics and Gynaecology of the Institute. After explaining the detailed study design, informed consent was taken from all the study subjects. The study included a total of 50 females with singleton pregnancy and gestation age of 28-30 weeks.

The inclusion criteria for the study were subjects with a singleton pregnancy, gestational age of 28-30 weeks, and subjects who were willing to participate in the study. The exclusion criteria were subjects with previous IUGR history, congenital anomaly history, multiple pregnancies, active labor, and rupture membrane history.

After the final inclusion of the study subjects, detailed history was taken followed by an examination. Diagnosis and screening of IUGR were done based on cardiotocography monitoring and doppler studies, ultrasound of suspected SGA, fundal height assessment by abdominal palpation at each visit, and accurate gestational age determination. All the included subjects were followed from final enrolment in the study to delivery.

Accurate determination of gestational age was done by the comparison of ultrasound from the first trimester to the last LMP. Estimation of gestational age by LMP has high accuracy in subjects where menstruation is regular, ultrasound to LMP time is less than 10 days, and ultrasound from 13 to 24 weeks is available to assess.

The collected data were subjected to the statistical evaluation using SPSS software version 21 (Chicago, IL, USA) and one-way ANOVA and t-test for results formulation. The data were

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expressed in percentage and number, and mean and standard deviation. The level of significance was kept at $p<0.05$.

RESULTS

The present prospective clinical study was conducted to attain the early assessment of IUGR (intrauterine growth retardation) with fetal biometric parameters using ultrasonography. The study included a total of 50 females with singleton pregnancy and gestation age of 28-30 months. On assessing the delivery mode in 50 included females, it was seen that 78% (n=39) of subjects underwent LSCS (lower segment cesarean section), whereas, vaginal deliveries were conducted in 22% (n=11) of the study subjects as depicted in Table 1.

On assessing the biometric parameters on ultrasonographical examination in the fetus, it was seen that the ratio of femoral length/abdominal circumference was normal in 48% (n=24) study subjects, whereas, abnormal femoral length/abdominal circumference was seen in 52% (n=26) study subjects. Concerning head circumference/abdominal circumference in the study subjects, normal results were seen in 54% (n=27) subjects, whereas, abnormal head circumference/abdominal circumference was seen in 46% (n=23) study subjects as shown in Table 2.

Concerning the doppler findings in the study females, it was seen that uterine artery ED notch was seen in 8% (n=4) study subjects, umbilical artery resistance Index was normal in 82% (n=41) study subjects, umbilical artery S/D (systolic/diastolic) ratio was normal in 82% (n=41) study subjects, uterine artery resistance index on the right side was normal in 84% (n=42) study subjects, whereas, on the left side, uterine artery RI was normal in 78% (n=39) study subjects. On color doppler assessment, uterine artery SD was normal in 84% (n=42) of study subjects on the right side, and in 88% (n=44) subjects on the left side in subjects showing IUGR (Table 3).

DISCUSSION

The present prospective clinical study was conducted to attain the early assessment of IUGR (intrauterine growth retardation) with fetal biometric parameters using ultrasonography. The study included a total of 50 females with singleton pregnancy and gestation age of 28-30 years. On assessing the delivery mode in 50 included females, it was seen that 78% (n=39) of subjects underwent LSCS (lower segment cesarean section), whereas, vaginal deliveries were conducted in 22% (n=11) of the study subjects. These findings were comparable to the studies of Ismail Mt et al[5] in 2018 and Gordijn SJ et al[6] in 2016 where authors reported similar demographics and delivery modes as in the present study.

Concerning the biometric parameters on ultrasonographical examination in the fetus, it was seen that the ratio of fetal length/abdominal circumference was normal in 48% (n=24) study subjects, whereas, abnormal fetal length/abdominal circumference was seen in 52% (n=26) study subjects. Concerning head circumference/abdominal circumference in the study subjects, normal results were seen in 54% (n=27) subjects, whereas, abnormal head circumference/abdominal circumference was seen in 46% (n=23) study subjects. These results were consistent with the studies of Guellec I et al[7] in 2015 and Napolitano R et al[8] in 2016 where comparable fetal biometric parameters as in the present study were reported by the authors in their studies.

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CONCLUSION

Within its limitations, the present study concludes that to accurately predict IUGR, femur length, abdominal circumference, and its correlation with head circumference are good indicators. Outcomes in pregnancies can be ascertained with a critical assessment of fetal and maternal charts. However, the present study had a few limitations including a small sample size, shorter monitoring period, and geographical area biases. Hence, more longitudinal studies with larger sample size and longer monitoring period will help reach a definitive conclusion.

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TABLES

S. No	Delivery Mode	Percentage (%)	Number (n)
1.	**LSCS (lower segment cesarean section)**	78	39
2.	**Vaginal**	22	11

Table 1: Type of delivery done in the study subjects

S. No	Biometry Parameters	Percentage (%)	Number (n)
1.	**Femoral length/ Abdominal circumference**		
a)	Normal	48	24
b)	Abnormal	52	26
c)	Total	100	50
2.	**Head circumference/ Abdominal circumference**		
a)	Normal	54	27
b)	Abnormal	46	23
c)	Total	100	50

Table 1: Biometric findings on ultrasonography in the study subjects

S. No	Doppler Findings	Percentage (%)	Number (n)
1.	**Uterine Artery ED notch**		
a)	Present	8	4
b)	Absent	92	46
2.	**Umbilical Artery Resistance Index (RI)**		
a)	Normal	82	41
b)	Abnormal	18	9
3.	**Umbilical Artery SD**		
a)	Normal	84	42
b)	Abnormal	16	8
4.	**Uterine Artery RI**		
a)	**Right**		
i.	Normal	84	42
ii.	Abnormal	16	8
b)	**Left**		
i.	Normal	78	39
ii.	Abnormal	22	11
5.	**Uterine Artery SD**		

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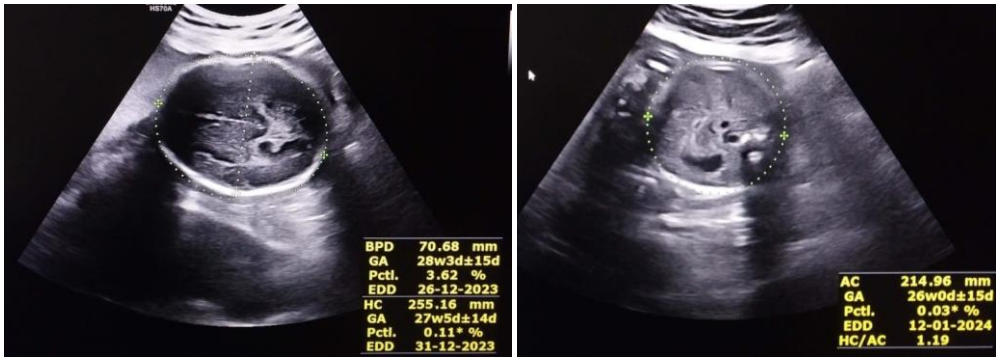
a)	**Right**		
i.	Normal	84	42
ii.	Abnormal	16	8
b)	**Left**		
i.	Normal	88	44
ii.	Abnormal	12	6

Table 3: Doppler findings for umbilical and uterine artery in the study subjects



a b

Figure 2: a- HC and b- AC measurement in an IUGR fetus showing increased HC/AC ratio

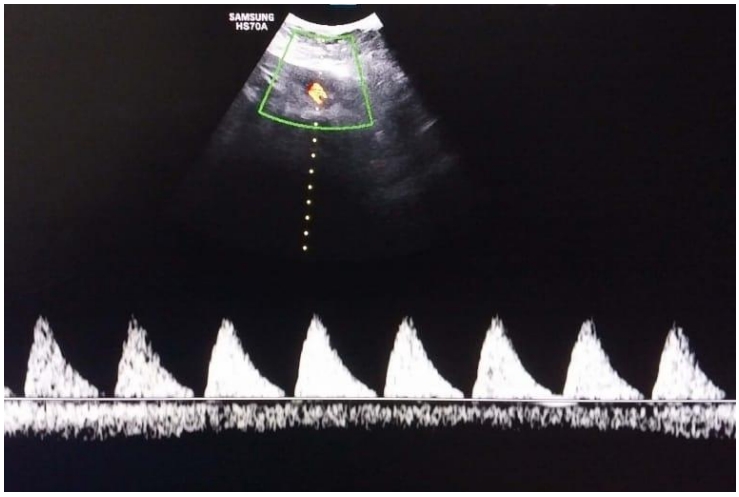


Figure 3: Umbilical artery doppler showing absent end diastolic flow in an IUGR fetus