ORIGINAL RESEARCH

Assessment of role of Ultrasound in Diagnosis of Intrauterine Growth Restriction

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ABSTRACT

Background: Intrauterine growth restriction (IUGR) is typically characterized as a condition affecting neonates whose birth weight falls below the 10th percentile. Hence; the present study was conducted for assessing role of Ultrasound in Diagnosis of Intrauterine Growth Restriction. **Materials & methods:** A total of 100 pregnancies that had been diagnosed clinically and ultrasonographically as intrauterine growth restriction (IUGR) were enrolled. All patients in the study underwent uniform antenatal assessment protocol and Doppler ultrasound studies. Ultrasound was done in all the patients. On USG, head circumference (HC) and abdominal circumference (AC) was assessed. All the results were recorded in Microsoft excel sheet and were subjected to statistical analysis using SPSS software. **Results:** The research involved a cohort of 100 patients diagnosed with intrauterine growth restriction (IUGR) stemming from various etiologies. These patients were categorized into three distinct groups based on the underlying cause of IUGR: maternal factors (n=49), placental factors (n=15), and idiopathic origins (n=36). Analysis revealed no significant differences in gestational age as determined by last menstrual period (LMP) and ultrasound gestational age (U/S-GA) across the three groups. However, a notable difference in the degree of growth retardation was observed, with the placental group exhibiting significantly greater retardation compared to the other two groups. Furthermore, when evaluating the ultrasound parameters among the different study groups, significant findings were recorded. **Conclusion:** In regions lacking access to Doppler technology, clinical diagnosis, despite its limited specificity, serves as an effective screening method for intrauterine growth restriction (IUGR). Nevertheless, when ultrasound equipment is accessible, integrating clinical assessment with sonographic evaluation enhances detection rates and facilitates a more accurate diagnosis of IUGR.

Key words: Ultrasound, Intrauterine growth restriction

INTRODUCTION

Intrauterine growth restriction (IUGR) is typically characterized as a condition affecting neonates whose birth weight falls below the 10th percentile. Given that IUGR is prevalent and associated with a two- to threefold increase in perinatal mortality, precise prenatal diagnosis is crucial for clinical management. Generally, IUGR is suspected when there is a notable discrepancy between the size of the uterus and the gestational age. However, the reliability of clinical indicators for diagnosing IUGR is limited. Therefore, a more accurate and objective assessment method is necessary for evaluating fetuses suspected of having IUGR. Current evidence supports the use of ultrasound as this objective diagnostic tool.[1, 2]

Ultrasound parameters utilized in the diagnosis of IUGR include biparietal diameter (BPD), head circumference (HC), abdominal circumference (AC), femur length (FL), and transverse cerebellar diameter (TCD), among others. Research indicates that among these measurements, abdominal circumference provides the highest diagnostic accuracy, ranging from 84% to 100%.[3, 4] However, the utility of AC for diagnosing IUGR is contingent upon having an accurate gestational date. Consequently, some researchers have explored the use of date-independent parameters, such as the FL/AC ratio, but this has been found to be an unreliable predictor of IUGR.[5] Recent findings suggest that the TCD/AC ratio is independent of gestational age, offering a promising alternative for

diagnosis.[6] Hence; the present study was conducted for assessing role of Ultrasound in Diagnosis of Intrauterine Growth Restriction.

MATERIALS & METHODS

The present study was conducted for assessing role of Ultrasound in Diagnosis of Intrauterine Growth Restriction. A total of 100 pregnancies that had been diagnosed clinically and ultrasonographically as intrauterine growth restriction (IUGR) were enrolled.All patients in the study underwent uniform antenatal assessment protocol and Doppler ultrasound studies. Ultrasound was done in all the patients. On USG, head circumference (HC) and abdominal circumference (AC) was assessed. All the results were recorded in Microsoft excel sheet and were subjected to statistical analysis using SPSS software. Univariate analysis was done for evaluation of level of significance.

RESULTS

The research involved a cohort of 100 patients diagnosed with intrauterine growth restriction (IUGR) stemming from various etiologies. These patients were categorized into three distinct groups based on the underlying cause of IUGR: maternal factors (n=49), placental factors (n=15), and idiopathic origins (n=36). Analysis revealed no significant differences in gestational age as determined by last menstrual period (LMP) and ultrasound gestational age (U/S-GA) across the three groups. However, a notable difference in the degree of growth retardation was observed, with the placental group exhibiting significantly greater retardation compared to the other two groups. Furthermore, when evaluating the ultrasound parameters among the different study groups, significant findings were recorded.

Table 1: Age

IUGR	Mean	SD
Maternal	29.4	2.5
Placental	31.5	2.7
Idiopathic	30.7	2.5

Table 2: Gestational age and retardation of growth by weeks

Variable	Maternal	Placental	Idiopathic	p-value
GA by LMP	35.3	37.1	35.2	0.45
GA by U/S	30.3	31.1	30.9	0.22
Retardation	4.16	6.96	5.55	0.00*

*: Significant

Table 3: Distribution of HC/AC ratio among the different groups according to its state (abnormal or normal)

Variable	Maternal	Placental	Idiopathic	p-value
HC/AC ratio normal	7	5	33	0.00 (Significant)
HC/AC ratio abnormal	42	10	3	
Total	49	15	36	

DISCUSSION

Intrauterine growth restriction (IUGR) continues to be a major contributor to perinatal mortality, morbidity, and disabilities in childhood. IUGR is characterized by a sonographically estimated fetal weight that falls below the 10th percentile for the corresponding gestational age. The majority of IUGR cases are linked to placental insufficiency. However, there are various other factors that can lead to IUGR, including maternal health issues, congenital anomalies, infections, and the effects of certain medications, which may indirectly result in placental insufficiency.[7]The assessment of placental function through umbilical artery Doppler ultrasound has become a clinical standard for diagnosing IUGR. Ultrasound imaging plays a crucial role in both the diagnosis and management of growth restriction. The identification of IUGR relies on fetal measurements, evaluation of amniotic fluid volume, and other relevant sonographic indicators.[8]At present, ultrasonographic assessment is the preferred and widely accepted method for diagnosing inadequate fetal growth. This technique provides several advantages, including relatively accurate estimations of fetal weight, the ability to determine the rate of fetal growth over time, the measurement of various fetal dimensions to characterize growth abnormalities, and support in exploring the underlying causes of restricted growth.[9, 10] Hence; the present study was conducted for assessing role of Ultrasound in Diagnosis of Intrauterine Growth Restriction.

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age (U/S-GA) across the three groups. However, a notable difference in the degree of growth retardation was observed, with the placental group exhibiting significantly greater retardation compared to the other two groups. Furthermore, when evaluating the ultrasound parameters among the different study groups, significant findings were recorded.Marhatta N et al conducted a comparative analysis of the accuracy of clinical diagnosis versus sonographic diagnosis in identifying intrauterine growth restriction (IUGR). The sensitivity of symphysis-fundal height (SFH) measurements for detecting IUGR was found to be 71.4%, while ultrasound demonstrated a sensitivity of 75.7%, with Doppler ultrasound achieving the highest sensitivity at 82.9%. In terms of specificity, SFH exhibited a rate of 43.6%, ultrasound showed 64.3%, and Doppler reached 86.2%. Additionally, Doppler ultrasound provided the highest negative predictive value (NPV) at 92.6%, compared to 79.1% for SFH and 86.8% for ultrasound. The integration of clinical and ultrasound diagnoses resulted in an increased sensitivity of 95.2% and an NPV of 95.91%. However, combining clinical assessments with Doppler did not yield a significant improvement in diagnostic outcomes. Overall, Doppler ultrasound stands out as the most effective method for diagnosing IUGR, characterized by its high specificity and NPV. Nonetheless, the significance of clinical diagnosis remains critical, particularly in developing nations where resources may be constrained.[10]Law TL et al compared prenatal ultrasound parameters for intrauterine growth restriction (IUGR) with newborn percent body fat (%BF). It was a prospective study of 87 pregnancies followed with ultrasound. Subjects were categorized into 3 groups: estimated fetal weight (EFW) less than the 10th percentile, abdominal circumference (AC) less than the fifth percentile, and normal biometry. Neonatal %BF by air displacement plethysmography was compared between each group using multivariable analyses. The %BF in the EFW less than the 10th percentile group (5.1 ± 2.9%) was significantly lower than either AC less than the fifth percentile (9.5 ± 3.3%) or normal groups (11.6 ± 5.6%). EFW less than the 10th percentile best predicted %BF by regression model. Neonatal morbidity was not significantly higher in the EFW less than the 10th percentile group.Newborn %BF was significantly lower in infants with EFW less than the 10th percentile compared with AC less than the fifth percentile, an intermediate finding. An AC less than the fifth percentile on ultrasound does not reflect the same severity of IUGR as EFW less than the 10th percentile.[11]

CONCLUSION

In regions lacking access to Doppler technology, clinical diagnosis, despite its limited specificity, serves as an effective screening method for intrauterine growth restriction (IUGR). Nevertheless, when ultrasound equipment is accessible, integrating clinical assessment with sonographic evaluation enhances detection rates and facilitates a more accurate diagnosis of IUGR.

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