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Evaluation of AFI Among Fetal Growth Restriction Pregnancies in 2nd Trimester

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Abstract

Intrauterine growth restriction is a growth of fetal disorder in which the fetal weight is below the normal weight (below ten percent) for the analogous gestational age. IUGR is the leading contributor to perinatal morbidity and mortality. The majority of females have a gestational age of 34 weeks. The objective of our study is to evaluate fetal growth restriction on ultrasound. A total of 100 cooperative responding patients were included in the study and the study was carried out in Fatima Medical Center Rahim Yar Khan. This observational evaluated fetal growth restriction (FGR) using ultrasound measurements—HC, AC, BPD, FL, and P.I index—across gestational ages of 10–36 weeks. Executed at Fatima Medical Center, Rahim Yar Khan, it involved 50 singleton pregnancies with normal uterine conditions, using availability sampling. Exclusions were multiple pregnancies, uncooperative patients, and conditions like PCOS. Ultrasound scans were performed with a LOGIQ E9 Rev 5 curve linear transducer and FGR was assessed by a radiologist based on biometric parameters. Ultrasound plays an indispensable role in the detection, evaluation, and ongoing monitoring of fetal growth restriction (FGR). Its non-invasive nature, widespread availability, and real-time imaging capabilities make it the most reliable tool for assessing fetal development across all three trimesters.

Key words: IUGR, Fetus, Third Trimester, Ultrasound, Restriction, Gestational, Perinatal, Mortality, Morbidity.

Introduction

Fetal growth restriction, as described by the American College of Obstetricians and Gynecologists, is a serious pregnancy problem that is represented by the fetus's impotence to reach its full potential for growth. It influences between 5–10% of births worldwide and is a key source of perinatal sickness and fatality (Blue et al., 2018). Small for gestational age is most commonly explained as an infant with a weight at time of birth for gestational age <10th centile for a customized standard or population. These definitions of small for gestational age will include a ratio of babies (18-22%) who are fundamentally small but healthy (McCowan et al., 2018).Fetal growth restriction (FGR) is the second most common cause of perinatal demise, impacting 5–10% of pregnancies (Nardozza et al., 2017).Major concerns in obstetrical practice

matters the diagnosis, monitoring, and delivery timing of fetuses who are at risk of having fetal growth restriction (FGR). Lately, the International Society for Ultrasound in Obstetrics and Gynecology and the Society for Maternal-Fetal Medicine issued clinical suggestions for the therapy of FGR (Lees et al.,2022). Perinatal demise, and fetal growth retardation (FGR) are more common in twin pregnancies. Compared to dichorionic twin pregnancies, monochorionic twin pregnancies are more likely to be affected by FGR, with almost double the risk of growth restriction (19.7%/10.5%) and a increased occurrence of related perinatal death (75.1/1000 against 33.0/1000) (Townsend et al.,2018). Fetal smallness, frequently found on the 10th weight centile threshold, can be caused by components like placental insufficiency. Nonplacental fetuses have normal perinatal outputs, while tiny fetuses with placental insufficiency have poorer outputs (Figueras et al., 2017). There are two classes of IUGR causes: fetal and maternal. Multiple gestations, hereditary disorders, infections, congenital deformities, and placental/cord deviations are in the midst of the fetal etiologies. Reduced blood volume, lower oxygen carrying capacity, nutritional status, decreased uteroplacental blood flow, and teratogens are the classes of maternal etiologies. (Hendrix et al., 2008). Early sonography examination includes maternal serum markers, uterine artery Doppler, and medical and obstetric history to evaluate the risk of a FGR fetus. The most authentic indicator of clinical deterioration and delivery circumstances is uteroplacental Doppler (Dall'Asta et al., 2017). The following biometric measures were part of the essential ultrasound measurements taken at every checkup: Biparietal Diameter (BPD). Head circumference (HC), Femur Length (FL), Humerus length (HL), Abdominal Circumference (AC). All readings are taken three times from three autonomously created ultrasound images during each assessment, and they are electronically delivered to the data management system together with comparable images. The analyses make utilization of the median of each criterion three measurements (Kiserud et al.,2017). To control fetal growth restriction (FGR), using factors like Doppler uterine artery Doppler, cerebroplacental ratio, and maternal angiogenic variables, distinguish between constitutional small-for-gestational age and "true" fetal growth restriction (FGR). Remarking a balance among risks and fetal harm or death is compulsory (Figueras et al., 2014). Since there are no confirmed treatments to treat IUGR, prenatal care priorities on choosing the best delivery time and technique. It is important to assess IUGR early on, execute sufficient surveillance to examine fetal health, and take suitable action in the event of fetal trouble in order to avoid outcomes related to the problems(Salam et al.,2014).Fetal health examination and rapid delivery are initially management procedures for FGR, with tests classified as acute or chronic, with chronic tests demonstrating severe hypoxia and metabolic acidosis(Figueras et al.,2011)By focusing care on fetuses that are actually suspected to a poor perinatal outputs, antenatal bias of small fetuses because of placental dysfunction instead of constitutionally-small fetuses would enhance clinical management, reduce surveillance fatigue, and removal of needless intervention for pregnancies with fundamentally-small fetuses. An extra clinical method for evaluating placental FGR prenatally may be placental biomarkers, for instance placental growth factor (PlGF), which are present in the mother's bloodstream (Benton et al., 2016). FGR is still a major problem in contemporary obstetrics, despite improvements in prenatal care. A thorough grasp of placental function, maternal-fetal interactions, and fetal growth patterns is necessary for the precise diagnosis and treatment of FGR. The study aim is to investigate the diagnostic accuracy of ultrasound in detecting and evaluation Fetal Growth Restriction (FGR) and develop the optimal criteria of ultrasound in detecting fetal growth restriction. This study also aims to aid evaluating eation of practical methods for enhancing fetal outcomes and lowering neonatal problems by investigating the function of ultrasound in identifying FGR.

Materials and Methods

This observational evaluated fetal growth restriction (FGR) using ultrasound measurements—HC, AC, BPD, FL, and P.I index—across gestational ages of 10–36 weeks. Executed at Fatima Medical Center, Rahim Yar Khan, it involved 50 singleton pregnancies with normal uterine conditions, using availability sampling. Exclusions were multiple pregnancies, uncooperative patients, and conditions like PCOS. Ultrasound scans were performed with a LOGIQ E9 Rev 5 curve linear transducer and FGR was assessed by a radiologist based on biometric parameters. A total of 100 cooperative responding patients were included in the study and the study was carried out in Fatima Medical Center Rahim Yar Khan.

Data Analysis Procedure

Data was analyzed with statistical procedures. Data was collected according to the data collection sheet. Data was evaluated and analyzed by SPSS version 27. Bar charts were constructed. Frequency and percentage were calculated for quantitative variables. Correlation between two variables were used.

Results

The resolution of this observational study's objective was to evaluate the fetal growth restriction on ultrasound such as HC, FL, BPD, and PI amongst different groups. The investigation was conducted at the radiology department of Fatima medical center Rahim Yar Khan. By analyzing these indices, the researcher seeks to identify the fetal growth restriction. To choose the study participant a convenient sampling technique was used. The inclusion criteria consisted of singleton pregnancy. Pregnancies from gestation sac of 10 to 36 weeks were included. Pregnancies of 1st trimester scan were included. Patients with good uterine are also included. Exclusive criteria compromised patients with multiple pregnancies, uncooperative patients and PCOS etc. In all, fifty individuals were included in the study. Ultrasonography machine of LOGIQ E9 Rev 5 is used with a curved probe to identify fetal growth restriction. Radiologists then evaluate the fetal growth restriction on ultrasound between 10 to 36 weeks of gestation.

Statistics

		PI. Index	growth restriction	HC	Fetal age	Movement	BPD	FL	AC
N	Valid	50	50	50	50	50	50	50	50
	Missing	0	0	0	0	0	0	0	0

TABLE 1.1

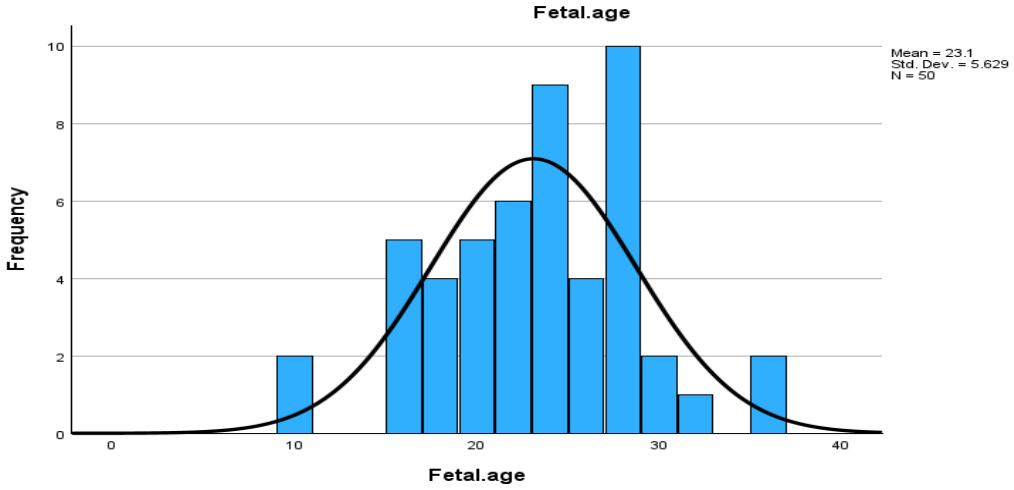

Fig 1.1

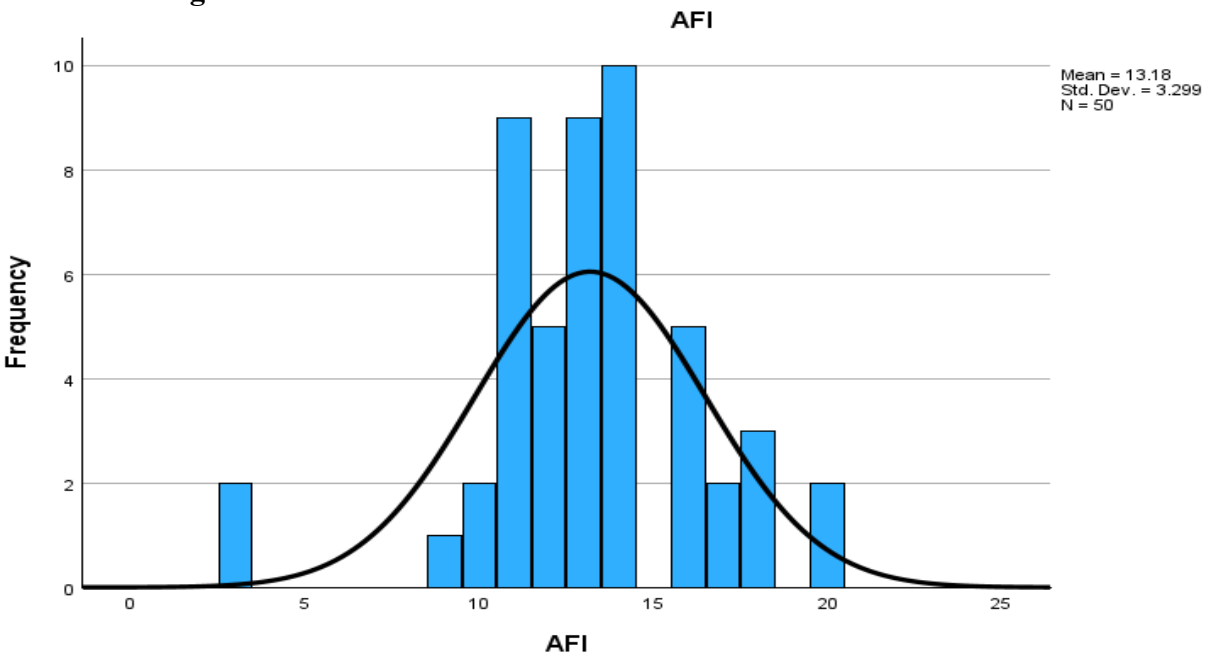

Fig 1.2

Discussion:

While ultrasound is widely recognized for its essential role in the detection and monitoring of fetal growth restriction (FGR), its diagnostic sensitivity can vary depending on methodology, timing, and criteria used. In our study, ultrasound identified FGR in 42 out of 50 patients (84%), demonstrating a notably high detection rate. This suggests strong clinical utility, especially when biometric measurements and Doppler indices are used across gestational ages ranging from 10 to 36 weeks. In contrast, Cardeux et al (2019) did a meta-analysis of 21 studies that reported pooled sensitivities of only 35% for abdominal circumference and 38% for estimated fetal weight (EFW) below the 10th centile in predicting birthweight under the 10th percentile. These differences may be attributed to the broader, more variable populations in the meta-analysis, differing gestational timing of ultrasound, or stricter diagnostic thresholds. Nonetheless, both our study and the meta-analysis emphasize that ultrasound, particularly when applied later in pregnancy and in conjunction with clinical judgment, remains a cornerstone in the effective diagnosis and management of FGR. In 2015 Stephen Lee stated that the (FGR) is

a complex multi-system syndrome that poses significant for both short- and long term health risks for the fetus. Early detection through screening is crucial, as recognized cases of FGR are associated with better perinatal outcomes compared to those that go undetected. Screening allows for the identification of at-risk pregnancies, enabling timely interventions to mitigate potential complications.

Conclusion

Ultrasound plays an indispensable role in the detection, evaluation, and ongoing monitoring of fetal growth restriction (FGR). Its non-invasive nature, widespread availability, and real-time imaging capabilities make it the most reliable tool for assessing fetal development across all three trimesters. In our study, 85% of the participants were diagnosed with FGR based on ultrasound findings, reinforcing its high diagnostic value. In our research 50 patients with gestation age of 10 to 36 weeks are included. Studies show that ultrasound evaluate 42 (84%) with fetus growth restriction and 8 (16%) with no restriction. Our findings support the routine use of ultrasound not only as a diagnostic tool but also as a means of guiding clinical decisions throughout pregnancy. Given the complexities of FGR, continuous research and the refinement of ultrasound protocols are essential to further enhance detection rates, ensure timely management, and reduce the risks associated with undiagnosed or mismanaged growth-restricted pregnancies.

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