Journal of Indian Academy of Obstetrics and Gynaecology January 2023

Vol. 4, Issue 2

Original Article

FETAL KIDNEY LENGTH, TRANSVERSE DIAMETER OF FETAL HEART, CONVENTIONAL USG PARAMETER FOR ESTIMATION OF GESTATIONAL AGE IN GROWTH RESTRICTED FETUSES IN THIRD TRIMESTER PREGNANCY.

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ABSTRACT

INTRODUCTION: An accurate determination of the gestational age and the expected date of delivery is fundamental to the successful management of pregnancies specially in fetal growth restriction. In Fetal Growth Restricted (FGR) fetuses, there is a huge discrepancy in gestational age by last menstrual period and per abdominal obstetric findings, which gets even worse when the lady is not sure of her last menstrual period. Currently there is no available third trimester ultrasound parameter which can predict gestational age accurately and one such parameter which remains unaltered even by Fetal Growth Restricted Fetuses (FGR) should solve the therapeutic dilemma of the obstetrician and hence nullify the probability of iatrogenic prematurity. There are studies on fetal kidney length and transverse diameter of the heart alone can be used to predict the gestational age in third trimester with normal pregnancy. But for the FGR fetuses, we did not come across any such parameter to estimate the gestational age at third trimester. The present study was done to determine whether fetal kidney length and transverse diameter of the heart can be used to estimate the gestational age in case of growth restricted fetuses. In third trimester of pregnancy.

METHODOLOGY: It is an observational cohort study carried out in the department of Obstetrics & Gynaecology, NEIGRIHMS in collaboration with the department of Radiology from January 2016 to January 2018. A total number of 70 women with singleton pregnancy with spontaneous conception and excellent dates and diagnosed as small for gestational age clinically and ultrasonologically were included for the study. In our present study we included cases of FGR in third trimester having excellent dates and subjected them for conventional biometry for dating and at the same time measured fetal kidney length and fetal transverse diameter of heart for dating of pregnancy. The obtained data were recorded in Microsoft Excel sheet and analysed to obtain PEARSON Correlation coefficient and prediction of p value by using SPS SOFTWARE 21 VERSION.

OBSERVATION: In our study fetal kidney length was found to be the superior parameter to estimate the gestational age in growth retarted fetuses (r^2-0785 and p value<0.0001). Next parameter was transverse diameter of fetal heart which can accurately estimate the gestational age in growth retatded fetuses (r^2-0.4686and p value<0.0001). Amongst the conventional parameters femur length was most

accurate (r^2-0.3080, p value <0.0001). Other conventional diameters like BPD, HC, AC and combined parameter did not correlate with the gestational age calculated from LMP or CRL in first trimester ultrasound.

CONCLUSION: Fetal kidney length can be used as a reliable parameter to estimate the gestational age in growth retarded pregnancies where all the conventional ultrasonological parameter fails to estimate the gestational age accurately.

Key words- Fetal growth restriction; conventional USG parameter; Fetal kidney length; Transverse diameter of fetal heart.

KEY WORDS: Letrozole, Clomiphene Citrate, Ovulation Induction, Intrauterine Insemination.

INTRODUCTION

An accurate determination of the gestational age and the expected date of delivery is fundamental to the successful management of pregnancies especially the fetal growth restricted babies. Proper assignment of the expected date of delivery is necessary in order to obtain and appropriately interpret laboratory tests and to plan and execute therapeutic maneuvers. There is increase in the number of high-risk pregnancies coming to the hospitals for the first time in third trimester. This poses a challenge to the obstetrician as timely decision to terminate the pregnancy is of utmost importance. This in turn necessitates the confirmation of gestational age precisely. Because without confirmation of the gestational age, termination of pregnancy might lead to iatrogenic prematurity. This may not be difficult in those who are sure of their gestational age or who had a first trimester or early second trimester scan. However, the situation is different in India where most of the pregnant women come to hospital for the first time in third trimester for institutional delivery. This also includes quite a number of fetal growth restricted fetuses (FGR). There is a huge discrepancy in gestational age by last menstrual period and per abdominal obstetric findings, which might be even worse when the lady is not sure of her last menstrual period. Because FGR needs to be terminated in appropriate time, gestational age has to be confirmed by the early ultrasound findings which might not available putting the obstetrician in therapeutic dilemma.

Currently there is no available third trimester ultrasound parameter which can predict gestational age accurately. One such parameter which remains unaltered even by Fetal Growth Restricted Fetuses (FGR) will solve the therapeutic dilemma of the obstetrician and nullify the probability of iatrogenic prematurity. Nirmala Shivalingaiah et al. conducted a study on "Fetal Kidney length as a parameter for determination of gestational age in pregnancy" and observed that the mean deviation from the gestational age at all the weeks is least for Kidney Length which correlated well with the assigned gestational age and found almost same as all the ultrasound biometric parameters put together [1]N. Hephzibah Kirubamani, M.R. Meenatshi et al found that transverse diameter of heart is more accurate for measuring the gestational age in third trimester in normal growing fetuses where LMP is not known[3]. But these studies are for normal growing fetuses. The present study is conducted whether fetal kidney length and transverse diameter of the heart are used to measure the gestational age in case of growth restricted fetuses in third trimester.

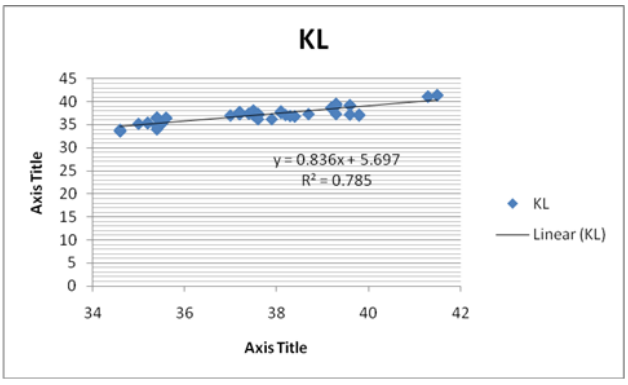
METHODOLOGY

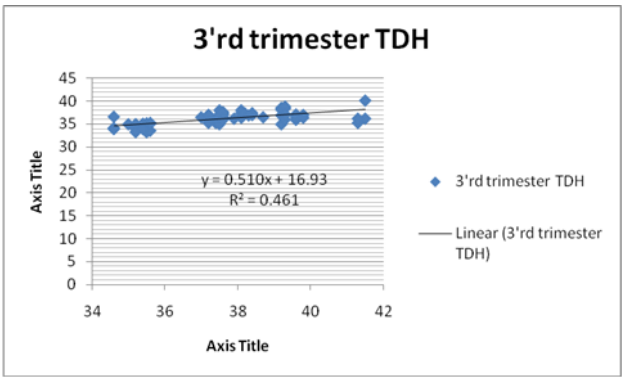
It is an observational study carried out in the department of Obstetrics & Gynaecology, NEIGRIHMS from January 2016 to January 2018. A total number of 70 women attending to our hospital for safe confinement and institutional delivery were enrolled for the study. Women with singleton pregnancy with spontaneous conception and with accurate dating scan and

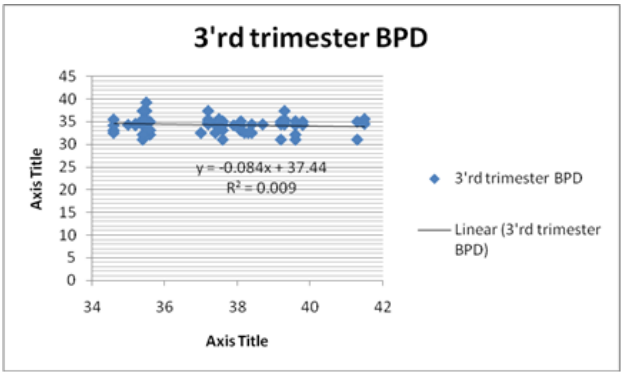
sure LMP and diagnosed as small for gestational age clinically and ultrasonologically were included for the study. Unknown last menstrual period, irregular menses, multiple gestation and fetal anomaly were excluded from the study group. Dating of pregnancy was done with women with adequate clinical information having known. L.M. P.; 28-30 days cycle; no recent use of Oral Contraceptives Pills; uterine size in agreement with the dates and the ultrasound examination between 16 to 24 weeks indicating that the fetal measurements are in agreement with the gestational age. b) Patients with inadequate or incomplete clinical information but with two ultrasound examination between 16-24 weeks showing linear fetal growth and similar USG EDD. Here we considered the dating of pregnancy with CRL length in first trimester. We suspected FGR if symphysiofundal height is less than 4cm from the gestational period, abdominal girth lesser than expected and serial growth curve by palpation lags and liquor is diminished clinically. After clinical suspicion we considered Ultrasound for biometry and biophysical profile. In our present study we included cases of FGR with excellent dates and subjected them to conventional biometry for dating and at the same time measured fetal kidney length and fetal transverse diameter of heart for dating of pregnancy in the third trimester. Transverse diameter of heart was taken in mm at closed atrioventricular valve junction, outer to outer points in four chamber view of heart. (This is normally done in our center) Three measurements of transverse diameter was done and the mean value was taken finally. Kidney length measurements were obtained in sagittal plane, when full length of kidney with renal pelvis is visualized. Maximum length of anyone single kidney is measured from upper pole to lower pole at least thrice and mean of the measurement is taken. Normal renal length measurements in the fetus increase with gestational age. If the difference in gestational age calculated from Last menstrual Period and first trimester crown rump length measurement is less than 7days gestational age is finally calculated based on LMP. If the difference is more than 7days than we calculated gestational age based on CRL length. It was a consecutive sampling method and 76 cases of of FGR was found in 2years the obtained data were recorded in Microsoft Excel sheet and analyzed to obtain PEARSON Correlation coefficient and prediction of p value by using SPS SOFTWARE 21 VERSION.

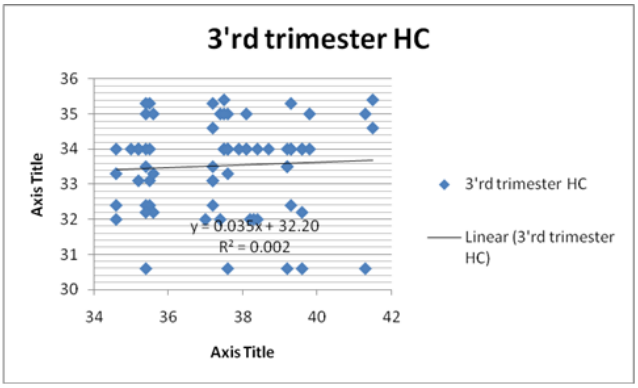
OBSERVATION

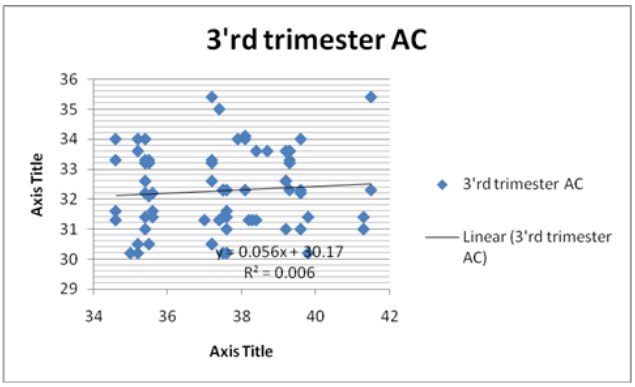
Parameter	Slope	Y intercept	R Square	95% confidence interval	P Value
Kidney Length	0.8369 ± 0.05299	5.698 ± 1.988	0.7858	0.7310 to 0.9427	< 0.0001(S)
Transverse Diameter of Heart	0.5186 ± 0.06698	16.65 ± 2.514	0.4686	0.3848 to 0.6524	< 0.0001(S)
BPD	-0.08408 ± 0.1032	37.44 ± 3.872	0.009663	-0.2902 to 0.1221	0.4182
HC	0.03534 ± 0.08314	32.21 ± 3.119	0.002649	-0.1307 to 0.2014	0.6722
FL	0.4131 ± 0.07510	18.44 ± 2.817	0.3080	0.2631 to 0.5631	< 0.0001(S)
AC	0.05597 ± 0.08729	30.18 ± 3.274	0.006011	-0.1184 to 0.2303	0.5235
Combined Gestational Age	0.1051 ± 0.06166	29.57 ± 2.313	0.04097	-0.01806 to 0.2282	0.0929

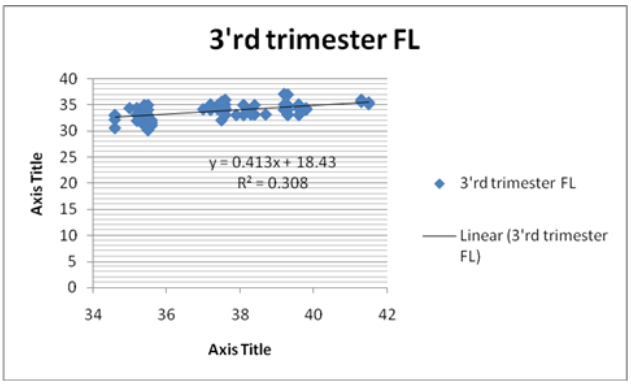


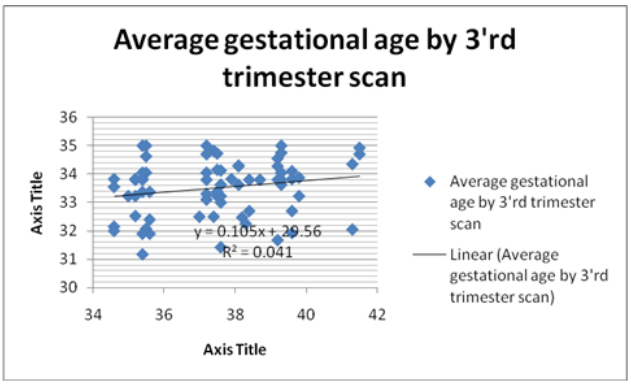












In our study fetal kidney length was found to be superior parameter to estimate the gestational age in growth retarted fetuses (r^2-0785 and p value<0.0001). Next parameter was transverse diameter of fetal heart which can accurately estimate the gestational age in growth retarded fetuses (r^2-0.4686 and p value<0.0001). Among the conventional parameters, femur length was most accurate (r^2-0.3080, p value <0.0001). Other conventional parameters like BPD, HC, AC, FL and combined parameter did not correlate to the gestational age calculated from LMP or first trimester CRL

DISCUSSION

In Fetal Growth Restricted Fetuses (FGR), there is a huge discrepancy in gestational age by last menstrual period and per abdominal obstetric findings or even worse when the lady is not sure of her last menstrual period. Because FGR needs to be terminated in appropriate time, gestational age has to be confirmed by the early ultrasound findings which is not available most of the time and leaves the obstetrician in the therapeutic dilemma. Usually conventional ultrasonological parameter like BPD, HC, AC, FL do not correspond to gestational age.(4) Nirmala Shivalingaiah et al. conducted a study on "Fetal Kidney length as a parameter for determination of gestational age in pregnancy" and observed that the mean deviation from the gestational age at all the weeks is least for Kidney Length which correlated well with the assigned gestational age and found almost same as all the ultrasound biometric parameters put together [1].Indu Kaul et tal in their study found that fetal kidney length is the most accurate single parameter for estimating gestational age than other biometric indices[2].N Hephzibah Kirubumani et al found in their study that fetal heart diameter at 32-36 weeks of gestation was equally effective to estimate the gestational age in third trimester compared to conventional USG parameter[3]. But these studies are confined to normal growing fetuses. In our study we used fetal kidney length and transverse diameter of heart to measure the gestational age in Fetal Growth Restriction. In our study, kidney length was found to be superior parameter to estimate the gestational age in FGR (r^2-0785 and p value<0.0001). Transverse diameter of fetal heart can also accurately estimate the gestational age in FGR (r^2-0.4686and p value<0.0001). Among the conventional parameters, femur length was most accurate (r^2-0.3080, p value <0.0001). According to Witzani L, Brugger PC, Hörmann M, et al, Fetal kidney growth is constant, increases ≈1.7 mm fortnightly throughout pregnancy and unchanged by growth disorders [5]. Study by

Konje et al also found that growth restriction predominantly affects the antero posterior diameter and transverse diameter of fetal kidney but length remains unchanged [6]. Brennan S, Watson D, Rudd D, Schneider M, Kandasamy Y have done systematic analysis in FGR fetuses and found kidney length remained similar to appropriately grown fetuses whereas AP and TS dimensions were significantly decreased [7]. Hill et al in their study showed inconsistent effect of growth restriction and heart circumference [8]. In our study we had better correlation of fetal kidney length and gestational age than other ultrasonological parameters and that is also not affected by fetal growth restriction.

LIMITATION OF STUDY

The weakness of this study is that we did not get sufficient literature about kidney length and transverse diameter of the heart in FGR fetuses. Also, our sample size is only 70 as we get FGR pregnancies mostly unbooked in 3rd trimester with no first or second trimester ultrasound.

CONCLUSION- Most of the conventional ultrasonological parameter fails to estimate the gestational age in 3rd trimester for unbooked pregnant women with no previous early trimester USG. Fetal kidney length, femur length and transverse diameter of the heart can be used as a parameter to estimate the gestational age in growth restricted fetuses. Among these, fetal kidney length was the most accurate and reliable parameter to estimate the gestational age in FGR pregnancies.

Comment (usually conclusion is written in general,not according to study)

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Received: 23.12.2022
Accepted: 3.1.2023
Published: 28.1.2023
Citation: **Panda S, Das** A. **Fetal kidney LENGTH, TRANSVERSE diameter of fetal heart, conventional USG PARAMETER FOR estimation of gestational age in growth restricted fetuses in third trimester Pregnancy.** J Indian Acad Obstet Gynecol. 2023;4(2):29-34.

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