



ASSESSMENT OF FETAL AGE BY CORRELATION BETWEEN BIPARIETAL DIAMETER WITH FETAL KIDNEY LENGTH IN THIRD TRIMESTER

Anatomy

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ABSTRACT

A prospective study was carried out in the department of Anatomy, department of Radiology, department of Obstetrics and Gynecology in Dr. D. Y. Patil Medical College & Hospital, Navi Mumbai. 319 healthy pregnant women in 26-40 weeks gestational age were scanned for the purpose of this study. The purpose of this study was to develop a gestational age estimation model using ultrasound fetal kidney length (FKL) parameters. Our findings showed that FKL measurements combination with BPD parameters could predict age of pregnancy with a better precision. A significant correlation was found between BPD GA and FKL GA.

KEYWORDS

Biparietal diameter, Fetal kidney length, Gestational age.

INTRODUCTION

In 1958, Sir Ian Donald took the landmark step in implementing ultrasound (USG) for obstetric scan. (1). Biparietal diameter (BPD) was first used to determine the GA in third trimester. Sonographic parameters that are used in the second and third-trimester pregnancy are as follows: BPD, HC (head circumference), AC (abdominal circumference, or FL (Femoral length). Combining measurements significantly improve accuracy compared with a prediction based on single parameter. A true estimation of gestational age at which plays an important role in quality maternity care such as assessment of fetal growth and to schedule the labor date. Any inaccurate estimation can result in iatrogenic pre and post maturity which is associated with increased prenatal morbidity and mortality. (2)

As the kidneys mature, the pelvi-calyceal system becomes more apparent. Identification of either one or two kidneys by the ultrasound is possible in 90% of cases from the 17th until 22nd week of gestation, and that is the critical time for genetic consultation. After the 20th week, the kidneys are identified in 95% of cases. (3) Unfortunately, diagnosis of renal abnormalities appears relatively late in fetal life or postnatal so in this study third trimester of pregnant was selected.

This study aimed to evaluate the normal fetal kidney length (FKL) and its correlation with GA of Biparietal diameter.

Materials and Methods

319 pregnant women of 20-30 age group with singleton pregnancy without any complication of 26 to 40 weeks of GA were selected for the study. Patients selected were registered in Department of Obstetrics and Gynecology, Dr. D. Y. Patil Medical College & Hospital, Navi Mumbai. The study was approved from the Institutional Ethical Committee.

Women with irregular menstrual cycles, Multiple gestation, Suspected fetal anomalies, Intrauterine growth UGR, Oligohydramnios, Polyhydramnios were excluded from study.

The patients were evaluated as per the history, general physical examination, Antenatal examination and routine antenatal investigations. Thus Obstetric ultrasonography was performed with the patient in the supine position using a 3.5 MHz convex probe of the Mindray ultrasound machine. The women were underwent standard ultrasound fetal biometry like Biparietal diameter (BPD), Head circumference (HC), Abdominal circumference (AC) and Femur length (FL) and these the traditional measurements used to estimate Gestational age.

The length of both right and left fetal kidneys was measured when both kidneys were seen clearly. The length of fetal kidney is a bipolar measurement using gray scale real time ultrasonographic scanner with 3.5-5.0 MHz transducer. Measurements are obtained in the sagittal plane, when full length of kidney with renal pelvis is visualized.

Figure No. 1 - Measurement of Biparietal Diameter BPD (cm)

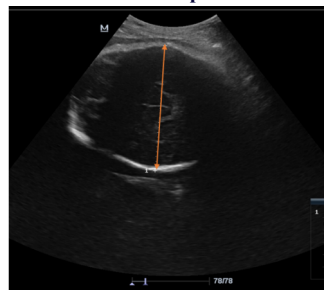


Figure No. 2 - Measurement of Fetal kidney Length (cm)



Observations and Results :-

For observation in interval of two weeks group were observed and result was obtained. Mean and SD were calculated. statistical analysis was done by using SPSS.

Table No. 1 Multiple Parameters

GA Group	BPD (cm)		RFKL (mm)		LFKL (mm)		MFKL (mm)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
26-28	7.06	0.22	27.38	1.12	28.46	1.61	27.92	1.30
29-31	7.58	0.22	29.88	2.22	30.66	2.05	30.27	2.06
32-34	8.35	0.20	33.36	1.52	34.31	1.12	33.86	1.32
35-37	8.93	0.25	35.32	1.40	36.69	1.17	36.02	1.21
38-40	9.42	0.14	37.79	1.35	39.41	1.21	38.60	1.23

Mean and SD were calculated for BPD, Right Fetal Kidney Length (RFKL), Left Fetal Kidney Length (LFKL) and Mean Fetal Kidney Length MFKL.

Table No 1 showed MFKL 27.92 mm in group 26-28 GA, 30.27 mm in 29-31 GA, 33.86 mm in 32-34 GA, 36.02 mm in 35-37 GA and 38.60 mm in 38-40 GA Group. This values shows fetal kidney increases in length full term. It also showed mean length of fetal kidney is equal to gestational week.

Table No. 2. Gestational Age by Various parameter in Different Groups

Gestational Age (GA)	BPD GA		MFKL GA		T value	P value
	Mean	SD	Mean	SD		
26-28	28.153	0.798	27.792	1.118	90.22	0.001
29-31	30.192	0.729	30.425	1.181	89.47	0.001
32-34	33.536	0.761	34.068	1.08	148.08	0.001
35-37	35.906	1.248	36.38	1.000	33.73	0.002
38-40	38.195	0.735	38.60	0.917	208.87	0.000

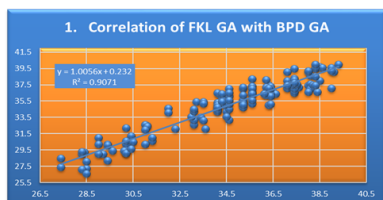
Table No. 2 showed mean and SD of BPD GA and MFKL GA analysis was done and T value and P value was calculated .In all GA group it was highly significant .

Table No. 3 : Correlation co-efficient of MFKL GA with BPD GA.

GA groups	Pearson correlation	R2	P- value
26-28	0.85	0.2600	0.000
29-31	0.84	0.3412	0.000
32-34	0.84	0.1170	0.000
35-37	0.85	0.4357	0.000
38-40	0.84	0.1506	0.001

Above table showed Pearson correlation between MFKL GA and BPD GA in different groups. p – value showed highly significant in all GA groups.

Analysis showed there is strong correlation between BPD GA and MFKL GA.

Graph No.1**DISCUSSION :**

The study by Bertagnoli et al and their chart were recommended.(4) The reference articles showed, that mean length increases with gestational age.

kidney length in Bangladesh reported that the average fetal kidney length of full term is 39.5mm. The findings are similar to our study. (5)

Chatterjee S concluded that Kidney length can be used as an individual parameter in estimating gestational age, especially in later trimesters, where biometric indices may not be much reliable.(6)

In our study the kidneys were easily identify in the third trimester and both kidneys in all cases were measurable. However, when only one kidney can be measured in difficult cases, the insignificant differences between the left and right KL does not affect the GA estimation (7).

Konje et al., was performed on 85 pregnant women and used the length of fetal kidney for prediction the age of pregnancy (7). They indicated that KL between 24 and 38 weeks of pregnancy was a more accurate technique for determining GA than other feta-biometry parameters like BPD, HC, AC, and FL.

Kansaria JJ et al (2009) in their ultrasound based study on 70 pregnant women found that fetal kidney length,diameter and circumference increases linearly with gestational age of the fetus which is similar to our study.(8)

CONCLUSION :

The kidney dimensions easy to identifying and measurement. There was strong correlation between GA and fetal kidney length. FKL can be used as parameter to assess gestational age.

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