

# Evaluation of Fetal Gestational Age by Assessment of Fetal Renal Length: A Comparative Study

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## ABSTRACT

**Introduction:** In today's world of gynaecology, one of the important components is estimation fetal gestational age. Various parameters are available for it which includes; Fetal crown-rump length (CRL), head circumference (HC), biparietal diameter (BPD) and femur length (FL). Hence; we planned the present study to estimate fetal kidney length for measuring the gestational age and compare it with other parameters.

**Material and methods:** The present study included assessment of 128 women with singleton uncomplicated pregnancies. Ultrasonographic machine was used for measurement of kidney length (KL). Also assessment of BPD and FL was done. After obtaining all the results, the data was compiled by SPSS software. Chi-square test and student t test were used for assessment of level of significance.

**Results:** Mean length of kidney in the cases belonging to eighteenth week of gestation was found to be 12.25 mm. Maximum subjects belonged to thirty fourth week of gestation. Mean kidney length observed in subjects belonging to 34<sup>th</sup> week of gestation was 38.01 mm. We observed a significant association between GA and mean fetal renal length.

**Conclusion:** For estimation of GA during third trimester of pregnancy, fetal renal length assessment can be used as a reliable tool.

**Keywords:** Age, Fetal, Gestational

## INTRODUCTION

Precise assurance of gestational age (GA) is basic for the arrangement of fitting obstetric and neonatal care, including treatment of contaminations amid pregnancy with drugs that might be contraindicated in the initial trimester, recognition of development confinement and post-term pregnancies ( $\geq 42$  weeks growth), arrangement of antenatal corticosteroids amid preterm work, and choices in regards to whether to oversee or withhold serious care to a great degree untimely newborn children.<sup>1-4</sup> Fetal crown-rump length (CRL) measured by ultrasound in the vicinity of 7<sup>+0</sup> and 13<sup>+6</sup> weeks growth is the prescribed technique for exact dating of precipitously imagined pregnancies. Past 14 weeks, ultrasound up to 24 weeks is the upper suggested restricted for exact dating utilizing other fetal biometry estimations including head circumference (HC) and biparietal diameter (BPD).<sup>5-7</sup> Be that as it may, in asset restricted settings GA evaluation is inclined to inaccuracy. While a few distributions have shown effective sonography in asset restricted settings, quality routine ultrasound is seldom accessible. During second trimester, femur length (FL) is another trimester used for fetal age estimation. Where ultrasound is accessible, late attenders to antenatal care or birth focuses display dating

issues in all settings since ultrasound biometry is less exact and less exact when measured later amid pregnancy.<sup>8,9</sup> Hence; we planned the present study to estimate fetal kidney length for measuring the gestational age.

## MATERIAL AND METHODS

The present study was conducted in the department of gynaecology and human anatomy of the medical institute and included assessment of 128 women with singleton uncomplicated pregnancies, reporting from June 2014 to July 2016 with the purpose of routine ultrasound. Ethical approval was taken from institutional ethical committee and written consent was obtained after explaining in detail the entire research protocol. Inclusion criteria for the present study included:

- Uncomplicated pregnant women,
- Women more than 20 years of age,
- Women with single live normal fetus,
- Subjects with negative history of diabetes mellitus,
- Subjects with absence of intra-uterine growth retardation

Ultrasonographic machine was used for measurement of kidney length (KL). Also assessment of BPD and FL was done. In direction perpendicular to spine, and after adjusting the position of the subjects, axial sections were obtained. After obtaining all the results, the data was compiled by SPSS software. Chi-square test and student t test were used for assessment of level of significance. P-value of less than 0.05 was taken as significant.

## RESULTS

Two cases belonged of 18<sup>th</sup> week of gestation. Mean length of kidney in the cases belonging to eighteenth week of gestation was found to be 12.25 mm (Table 1). Mean length of kidney found in the cases belonging to 20<sup>th</sup> week of gestation was observed to be 15.60 mm (Figure 1). Maximum subjects belonged to thirty fourth week of gestation. Mean kidney length observed in subjects belonging to 34<sup>th</sup> week of gestation was 38.01 mm. Predictive value of various parameters is shown in Table 2. We observed a significant

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association between GA and mean fetal renal length.

**DISCUSSION**

In developing nations, various fetal biometric parameters are routinely used for estimation of GA. For estimating the delivery date, Ultrasound-predicted parameters like, fetal crown-rump length (head circumference or femur length in early second trimester) are used, even in cases of absent last menstrual period (unknown).<sup>10-12</sup> Hence; we planned the present study to estimate fetal kidney length for measuring the gestational age.

In the present study, we observed an increase in the length of fetal kidney with progression of pregnancy from eighteenth week to thirty eighth week of gestation. Kumara K et al comparatively evaluated fetal kidney length vs biparietal diameter (BPD) and femur length (FL) and the role of fetal kidney length in estimating gestational age in the second and third trimesters. In this study, 199 women going to the OPD department with singleton uncomplicated pregnancy participated. They underwent regular ultrasound fetal biometry. The length of fetal kidney was measured twice a week from 18<sup>th</sup> week to 38<sup>th</sup> week of gestation. From the biometric indices (BPD and FL) and kidney length, they derived linear regression models to estimate gestational age. The fetal kidney was visible sonographically only after 18<sup>th</sup> week of gestation (mean kidney length=12±1.31 mm). The average length of the fetal kidney was increasing evident from the length of kidney at 38<sup>th</sup> week of gestation (40.4±1.71 mm). For the evaluation of fetal gestational age, femur length, kidney length, and biparietal diameter in a specific order with standard mistake of ±3.85 days, ±8.04 days, and ±8.75 days respectively is considered as the best method for linear regression model.<sup>13</sup> Ugur MG et al determined the validity of fetal kidney length and amniotic fluid index (AFI) in labor dating. In this study, they included 180 pregnant ladies reporting to outpatient facility at Department of Obstetrics and Gynecology, Gaziantep University, Turkey from January 2014 to January 2015. The evaluation of gestational age was done using early fetal ultrasound measures and last menstrual period. The measurement of fetal kidney length, regular fetal biometric parameters and amniotic liquid list was done. The connection between the gestational age, fetal kidney length and amniotic liquid record was contemplated. By measuring the mean gestational age from last menstrual period to first ultrasound, the mean gestational age was 31.98±4.29(24-39 weeks). The average length of fetal kidney was 35.66±6.61 (19-49 mm). The gestational age and fetal kidney length had a significant correlation.

The correlation between GA and AFI was moderate negative. Adding fetal kidney length to the normal biometrics enhanced the adequacy of the model used to appraise GA. Gestational age can be better anticipated by adding fetal kidney length to other routine parameters.<sup>14</sup>

Konje JC et al assessed the utilization of kidney length estimation to the assurance of gestational age between the 24th and 38th weeks and to contrast its exactness and that of other fetal biometric records. Seventy-three ladies with

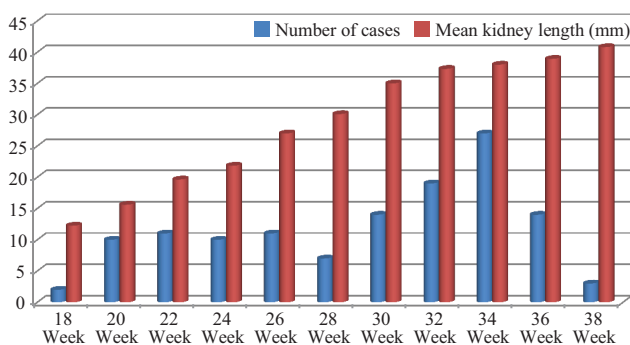
Gestational Age (weeks)	Number of cases	Mean kidney length (mm)
18 Week	2	12.25
20 Week	10	15.60
22 Week	11	19.64
24 Week	10	21.84
26 Week	11	27.01
28 Week	7	30.10
30 Week	14	35.01
32 Week	19	37.33
34 Week	27	38.01
36 Week	14	38.93
38 Week	3	40.81

**Table-1:** Mean Renal Length

Parameter	Intercept (a)	Slope (b)	p- value : Intercept	p- value : Slope
BPD	1.596	0.398	0.10	0.03*
FL	6.297	0.427	0.02*	0.01*
KL	9.886	0.669	0.01*	0.04*

\*: Significant

**Table-2:** Predictive values of different parameters



**Figure-1:** Descriptive values for mean renal length

singleton uncomplicated pregnancies experienced standard ultrasound fetal biometry and kidney length estimation like clockwork in the vicinity of 24 and 38 weeks' incubation. These estimations were utilized to date the pregnancies with respect to crown-backside length dating in the vicinity of 8 and 10 weeks' incubation. Direct relapse models for estimation of gestational age were gotten from the biometric lists and kidney length. Likewise, stepwise relapse models were developed to decide the best model for deciding gestational age in the vicinity of 24 and 38 weeks. Examinations were then made between the exactness of these models in the assurance of gestational age. A model including kidney length, biparietal width, head outline and femur length precisely anticipated gestational age with a standard blunder of +/- 8.57 days. These models were somewhat more exact than models got from the biometric records of biparietal distance across, head circuit and femur length (+/- 9.87 days), biparietal measurement, head periphery, femur length and stomach perimeter (+/- 9.45 days) and biparietal breadth and femur length (+/- 9.9 days). Kidney length is a more exact strategy for deciding gestational age than the fetal biometric files of biparietal distance across, head boundary, femur length

and stomach perimeter in the vicinity of 24 and 38 weeks' growth. At the point when consolidated with biparietal breadth, head boundary and femur length, the exactness of dating is enhanced by 2 days. This estimation is anything but difficult to make and could hence be effortlessly fused into the model for dating pregnancies following 24 weeks of incubation, specifically when estimations of the biparietal width and head perimeter are difficult.<sup>15,16</sup>

## CONCLUSION

From the results of present study, the authors concluded that for estimation of GA during third trimester of pregnancy, fetal renal length assessment can be used as a reliable tool.

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