

## TO DETERMINE THE USEFULNESS OF GESTATIONAL AGE CALCULATED BY ULTRASONIC MEASUREMENTS OF FETAL KIDNEY LENGTH AND CIRCUMFERENCE AFTER 30 WEEKS OF GESTATION

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**ABSTRACT: PURPOSE:** To determine the usefulness of gestational age calculated by ultrasonic measurements of fetal kidney length and circumference after 30 weeks of gestation as compared to standard biometric parameters like BPD, HC, AC AND FL. 1. Estimation of gestational age using BPD, HC, AC and FL in pregnant women with gestational age more than 30 weeks. 2. Estimation of gestational age using kidney length and circumference in pregnant women with gestational age more than 30 weeks. 3. Comparing the above gestational ages with that of calculated by their last menstrual period and statistical analysis of the data.

**INTRODUCTION:** Knowledge of gestational age is important to the obstetrician because it affects clinical management in many ways. First, this allows obstetrician to anticipate spontaneous delivery and plan delivery for the optimal perinatal outcome. Second, it helps in scheduling invasive procedures and genetic tests. Third, it helps in evaluating fetal growth because normal range of parameters change with advancing age. Virtually all important clinical decisions require knowledge of the menstrual age.

**Routinely, in obstetrical practice, gestational age was examined clinically by measuring fundal height in weeks and comparing it with menstrual history. The fallacies are:**

- A. Women not remembering LMP.
- B. Mentioning last day of period as LMP.
- C. Reporting missed period as LMP.
- D. Abnormal menstrual cycles.
- E. Conception in lactational amenorrhea as such, the gestational age and menstrual age were found not correlating and creating confusion for management decisions.

With the advent of sonogram, fetal parameters likes BPD, HC, AC & FL are standardized and successfully introduced into clinical practice for determination of gestational age.

It's also observed that the first trimester accuracy of gestational age determined by sonogram is + or-5 days in comparison with menstrual age. With advancing pregnancy, the accuracy is found to drop gradually to + or-10days in second trimester and + or-3 weeks in third trimester. As such, there is need for adding more parameters in the existing sonogram picture/study.

Fetal kidneys can be clearly visualized delineated from other viscera by 30 weeks of gestation. Standard kidney parameter measurements like length, anteroposterior diameter, circumference and volume are easily studied through a full bladder window by abdominal probe.

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Therefore our present study takes up estimating gestational age using sonographic measurements of kidney length and circumference after 30 weeks of gestation using again standard parameters like BPD, HC, AC, FL and compare with gestational age calculated from menstrual history

**MATERIAL AND METHODS:** The study was conducted for a period of one and half year from march, 2008 to July, 2009 at the department of obstetrics and gynecology, Santhiram General Hospital, Nandyal.

**SOURCE OF DATA:** Pregnant mothers presenting either to the outpatient department or in patients with gestational age more than 30 weeks by their LMP.

**Sample Size:** 100 cases.

**Inclusion Criteria:** Pregnant mothers are selected for the study, based on the following criteria;

- a) Gestational age more than 30 weeks.
- b) Reliable last menstrual period.
- c) Irrespective of any obstetrical complications.

**Exclusion Criteria:** Cases with fetal renal anomalies and twin gestation were excluded.

**METHOD:** 100 pregnant women attending outpatient department or in patients were included in the study based on the inclusion and exclusion criteria.

**Gestational Age:** Women with gestational age more than 30 weeks, calculated based on last menstrual period were selected for the study.

**Reliable Last Menstrual Period:** Reliability of the last menstrual period is assessed by:

- a) Regular last three menstrual cycles.
- b) No oral contraceptive or ovulation induction drugs usage.

**Obstetrical Complications:** Women with gestational age more than 30 weeks taken for study irrespective of their obstetrical complications like anemia, PIH, IUGR, hydramnios.

**Fetal Renal Anamolies:** Cases with fetal renal anomalies like pelvicaliceal dilatation, polycystic kidney disease, kidney length more than 7 cm, more than 2 cysts were excluded from the study.

After clinical examination and basic laboratory investigations these women are subjected to 2D transabdominal ultrasound examination using 3.5Hz frequency curvilinear transducer.

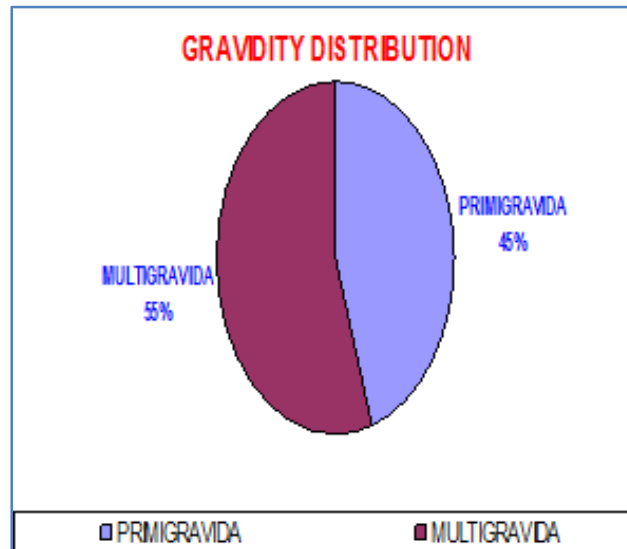
Fetal parameters BPD, HC, AC, FL, kidney length, kidney circumference are measured using standard criteria specified and composite gestational age is calculated using standard growth charts. (CGA2 – CGA3)

Gestational age is calculated based on their last menstrual period (CGA1). Differences in the gestational ages is calculated statistically analyzed.

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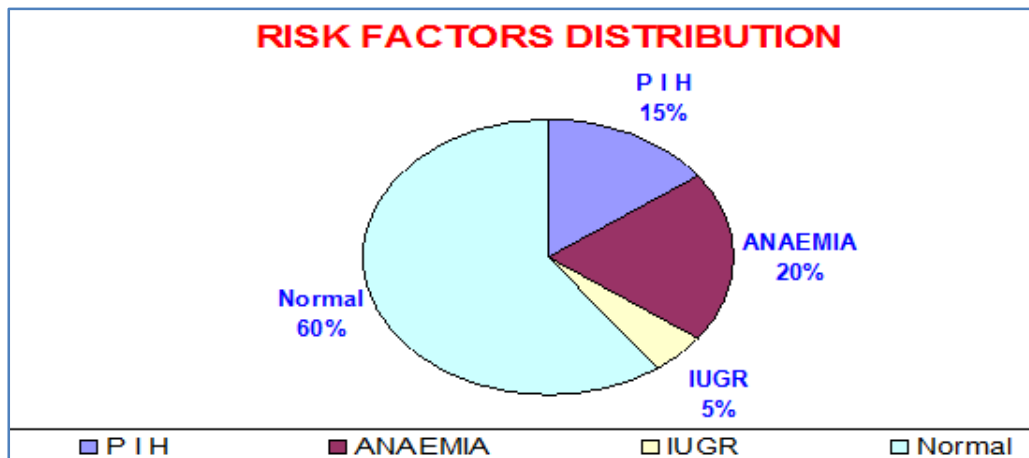
**OBSERVATIONS AND RESULTS:** 100 Antenatal women were selected and studied

a) **Gravidity distribution in the study Population:** 45(45%) were primigravida and 55(55%) were multigravida.



**Gestational age distribution in study Population:** There were 36cases (36%) with gestational age between 30-34wks of gestation, 36cases (36%) between 34-37wks of gestation, 28cases (28%) between 37 -40wks of gestation.

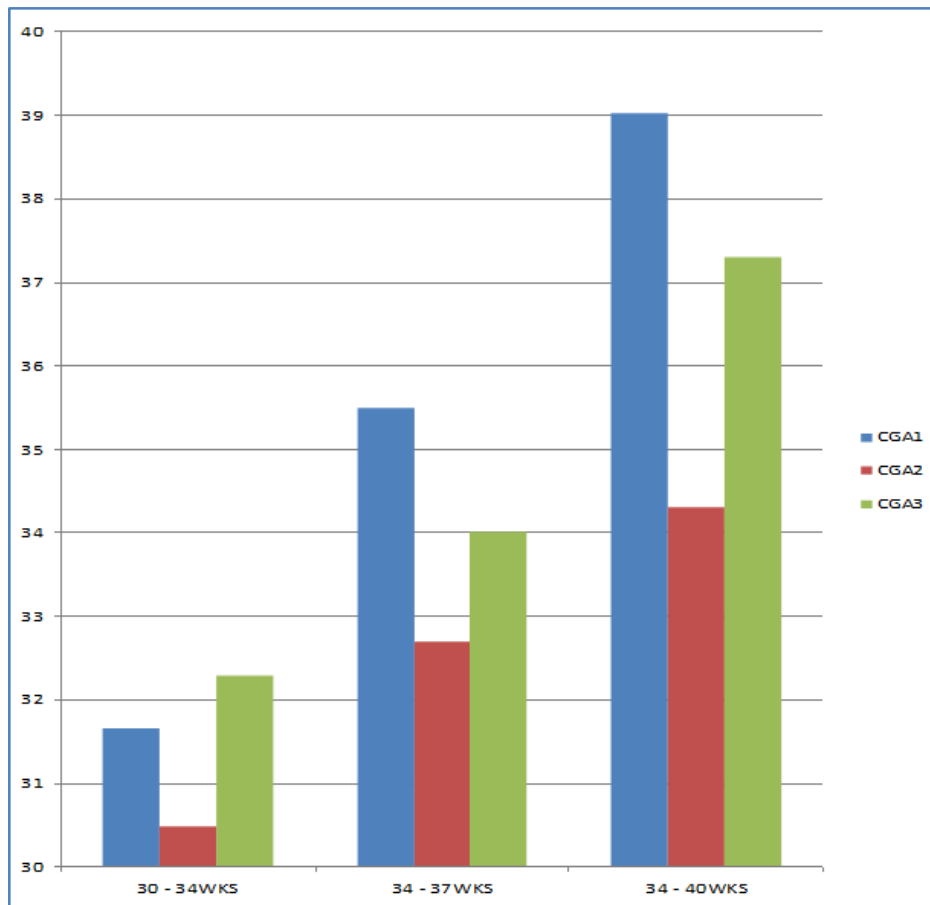
b) **Risk factors distribution in study Population:** In these, there were 15 cases (15%) of pregnancy induced hypertension, 20 cases (20%) of anemia and 5cases (5%) of intrauterine growth.



The mean gestational age calculated using LMP, standard biometric parameters (BPD, HC, AC and FL) and that using kidney length and circumference at 30 – 34wks, 34 – 37wks and 37 - 40 wks.

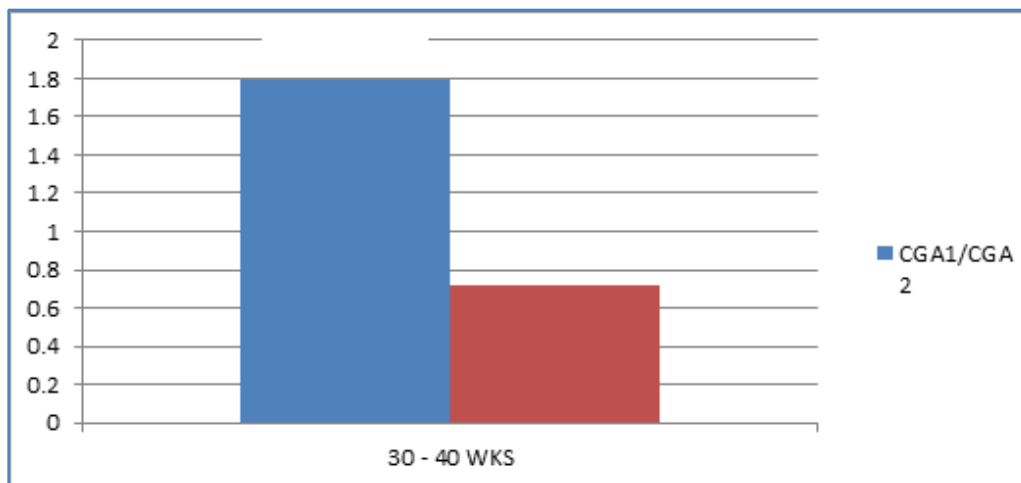
The mean gestational age calculated using LMP was 35.39wks, it was 32.5wks using standard parameters, it was 34.53 wks using kidney length and circumference.

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Mean gestational age difference between that calculated using standard parameters and that using kidney length and circumference.

Mean gestational age difference between CGA1 and CGA2 was 1.79 wks and between CGA1 and CGA3 was 0.72 wks.



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Though the mean gestational age difference using standard parameters and KC & KL was not statistically significant ( $p=0.99$ ) the prediction error using KC & KL is less than that of standard parameters.

In the present study 100 cases were studied and the prediction error in calculating gestational age using BPD, HC, AC and FL was 1.79wks and using KC and KL was 0.72 wks.

Study conducted by Kiran Pandey, Ajay Bhagoliwal, V. K. Singh published in journal of Obstetric & Gynaec Ind vol. 51 Nov./Dec. 2001 showed the prediction error using KC and KL was 1.5wks.

$R^2$  value using BPD, HC, AC and FL in the above study was 92.8% and using kidney length and circumference was 98.0%.

The present study showed  $R_2$  value using BPD, HC, AC and FL and using kidney length and circumference to be 94 % and 97.4%

J. C. Konje, K. R. Abrahams S. C. Bell, D. J. Taylor (2002) published study in ultrasound in Obstetrics and Gynec 19(6), showed prediction error using kidney length was 10.29 days.

The present study showed prediction error using kidney length was 14 days.

Iara (1993) reported a good correlation between right kidney length, left kidney length and gestational age. The present study also showed good correlation between mean kidney length and gestational age.

Konje et al (1997) has shown that kidney length at different gestational age is not significantly different in small for date and appropriate for date babies. The present study population had 5 cases of small for date babies and the kidney measurements correlated with gestational age.

100 antenatal women were selected with gestational age more than 30weeks as per their LMP considering the inclusion and exclusion criteria and were subjected to single 2D transabdominal ultrasound.

Various biometric measurements like BPD, HC, AC and FL were taken using standard methods and gestational age was calculated. Gestational age was also calculated using kidney length and circumference comparison and statistical analysis of this data is made.

Among 100 women, 45 were primigravida and 55 were multigravida. 36 of the women were between 30-34 weeks of gestation, 36 were between 34-37 weeks and 28 were between 37-40 weeks of gestation.

The mean gestational age of the sample was 35.39 weeks based on LMP. The mean gestational age estimated from the standard parameters and using kidney length and circumference was 32.50 and 34.53 weeks respectively and difference being 2.89 and 0.86 weeks respectively.

The prediction error in estimating gestational age after 30 weeks of gestation using BPD, HC, AC and FL was 1.79 weeks and with kidney length and circumference it was 0.72 weeks.

Women who present to the obstetrician after 30 weeks who do not recall their LMP's or with unreliable LMP's with no visits or ultrasound examination in early trimesters pose a great problem in assessment of gestational age which is very important in managing the obstetric cases more so high risk pregnancies.

**These women should be subjected to transabdominal ultrasound and apart from measuring the standard biometric parameters measurement of fetal kidney length can be included as:**

- a. The prediction error in estimating the gestational age after 30 weeks is less than standard biometric parameters.

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- b) Fetal kidney could be readily visualized after 30 weeks.
- c) Standard charts are available for the estimation of gestational age using kidney length and circumference.

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