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COMPARATIVE STUDY OF ESTIMATION OF GESTATIONAL AGE BY ULTRASONOGRAPHIC MEASUREMENT OF FETAL KIDNEY LENGTH WITH AVAILABLE CONVENTIONAL METHODS, ITS ACCURACY AND ACCEPTABILITY

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ABSTRACT: OBJECTIVES: 1. To study the gestational age by ultrasonographic measurement of fetal kidney length. 2. To compare and evaluate the accuracy, reliability and cost effectiveness of fetal kidney length measurement after 24 wks. Of gestation. 3. To compare the reliability and effectiveness of foetal right and left kidney length alone with BPD, FL, and AC. **METHODS:** This is a randomized study done in the department of Obstetrics & Gynaecology, Princess Esra Hospital, Deccan College of Medical Sciences, Hyderabad, Telangana. The data was collected between October 2014 to January 2015. **RESULTS:** BPD alone cannot be relied upon for determination of gestational age after 24 wks. of gestation. The left kidney length was found to be more reliable in determining the gestational age than the right kidney length. **CONCLUSION:** Kidney length can be considered as an acceptable parameters for determination of gestational age after 36wks. of gestation. Left kidney length is more reliable parameter than right kidney in determining the gestational age. **KEYWORDS:** Gestational age, ultrasonography, fetal kidney.

INTRODUCTION: Ultrasound has revolutionized the diagnosis and the management in the field of Obstetrics and Gynaecology, more so in Obstetrics where it has been a major contributor in management decision making. Its immense popularity is due to its non-invasive, non-toxic and non-ionizing nature.^(1,2)

Gestational age determination is one of the greatest step in the management in the timing of pregnancy termination and consequent decrease in perinatal mortality due to preterm deliveries

As with all discoveries and inventions, it is always imperative to look for better and more convenient techniques with an open and enquiring mind. In assessing the gestational age, the foetal kidney length opens up the possibility of finding the gestational age with a single parameter even though various studies with various organs are under active consideration and research.⁽³⁾

Aim of the study: to evaluate the accuracy, reliability and cost effectiveness of the use of foetal kidney length measurement as a single parameter in the determination of gestational age after 24th week of pregnancy.

OBJECTIVE OF STUDY:

1. To know whether a single USG examination is reliable to determine the gestational age after 24 weeks of gestation.
2. To evaluate whether the foetal kidney length can be used in determining the gestational age after 24 weeks.
3. To compare the reliability and effectiveness of foetal kidney length alone with BPD, FL and AC.

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MATERIALS AND METHODS: Randomly selected patients among those who attended the antenatal outpatient department of Obstetrics and Gynaecology of Princess Esra Hospital, Deccan College of Medical Sciences, Hyderabad, Telangana were selected for the study between October 2014 to January 2015.

Total number of antenatal cases who attended the outpatient department during this period was 2300 (Including new and old patients), out of which randomly selected 100 study subjects, and these were divided into two groups group A and group B.

Inclusion Criteria:

1. Patients who were sure about the date of the last menstrual period.
2. Patients with regular periods.
3. Of any age.
4. Of any parity.
5. Of any socio-economic status.

Exclusion Criteria:

1. Any associated maternal complication.
2. Congenital anomalies seen during ultrasound examination.
3. Where, only one kidney alone was visualized.
4. Any complication during delivery.
5. Unreliable patient and/or not willing for regular antenatal attendance.

METHODOLOGY: The patients (100) were divided into two groups.

Group A: A single ultrasound examination was done after 24 weeks of gestation and the parameters taken for the determination of gestational age were BPD, FL, AC and both the kidneys' length.

Group B: Two ultrasound examinations were done after 24 weeks of week's gestation and BPD, FL, and AC only were taken for the determination of gestational age. The two ultrasound examinations were taken at two different weeks of pregnancy:

1. The gestational age was determined by each parameter respectively.
2. The newborn babies of the patients selected for study were examined by the pediatrician at delivery and the gestational age of the babies were determined clinically by using the New Ballard Scoring system.⁴
3. Comparative study of the parameters in determining the gestational age was done and relative accuracy of the various parameters and cost effectiveness was evaluated.
4. Ultrasound machine used for our study was Aloka Flexus SSD 1100 with 3.5MHZ Curvilinear probe and multi format camera

Method of Statistical Analysis:

1. Student "t" test. This test is used to find a significant difference between two means.⁽⁵⁾
2. Least Square method is used to fit the relationship between gestational age and foetal biometric parameter (s). The predication have been compared on the basis of coefficient of determination R².
A "p" value of less than 0.05 was accepted as indicating statistical significance.

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In assessing the gestational age, the foetal femur length, the biparietal diameter and the abdominal circumference are taken into account usually, after 24 weeks of gestation. But, there is no single parameter to assess the gestational age.^(6,7)

RESULTS & DISCUSSION: Our study confirms once again that BPD cannot be relied upon for the determination of gestational age after 24 weeks of gestation.

BPD is a reliable parameter before 24 weeks with a single ultrasound examination and even multiple ultrasound examinations do not improve the reliability after 24 weeks.^(8,9)

Frequency of distribution of differences of gestational age determined at birth clinically from last menstrual period.

Variation in weeks	Frequency	Percentage
-5	1	2
-2	4	8
-1	12	24
0	17	34
1	3	6
2	3	6
3	1	2
4	3	6
5	1	2
7	1	2
8	2	4
9	1	2
12	1	2
Total	50	100

Table 1

Graph 1

Our study shows abdominal circumference is better than BPD in determining the gestational age and is almost equal to the femur length in determining the gestational age.

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Variation in weeks	Frequency	Percentage
-3	1	2
-2	1	2
-1	1	2
0	5	10
1	9	18
2	8	16
3	5	10
4	8	16
5	4	8
6	4	8
7	4	8
Total	50	100

Table 2

Graph 2

Variation difference between BPD, AC and FL were significantly different in our study but there was no statistically significant variation between AC and FL. Hence AC and FL are more acceptable indicators of gestational age after 24 weeks in our study.^(10,11,12)

The kidney even in the case of a small for dates fetus is good evidence of the gestational age of the fetus. (Gonzales et al in 1981). This is the first study to correlate the foetal kidney as a parameter in relation to gestational age.¹³

From 15 - 17 weeks, the kidneys were seen in less than half of the fetuses evaluated. One or both the kidneys were identified in 90% of cases from 17 - 22 weeks and in 95% cases after 22 weeks (Lawson et al in 1981).¹⁴

Our study was decided to have kidney length as the parameter in determining the gestational age after 24 weeks since its visualization is comparatively easier technically after 24 weeks during which period, the patients attending our hospital are more compared to the antenatal patient population attending OPD before 24 weeks.

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The observer bias was overcome by random selection of observers in our study and the observers were qualified sonologists.

From our study, we could deduce that, by right kidney length the gestational age determined is consistent with that of gestational age by LMP in only 12% of cases. If the difference is allowed for +2 weeks, then 36 per cent are consistent.

When the gestational age is determined by left kidney length 14 per cent are consistent with that of gestational age by LMP. If the difference is allowed for +2 weeks then 50 percent of the values are consistent with that of LMP gestational age.^{15,16}

Hence, from our study, the left kidney length was found to be more reliable in determining the gestational age than the right kidney length.

The polynomial regression which was tried for our study fitted but the data did not fit because, most of the patients were belonging to the >36 weeks gestation during which period, the growth was found to be static from the above review of literature. Hence, linear regression analysis of study was done.

In our study, all the parameters are highly inter related.

In our study, the difference between the lengths in male and female fetuses was not studied, as sex determination in utero is not advocated as a hospital policy as per PNDT (Prenatal Diagnostic Techniques) Act.

In our study, the determination of gestational age was done by using the 50 centile charts of each parameters.

In our study the mean difference (prediction width of gestational age) of foetal kidney length from LMP is +3 weeks after 36 weeks.

Frequency distribution of difference of gestational age determined by RKL FROM LMP.

Variation in weeks	Frequency	Percentages
-4	1	2
-3	1	2
-2	2	4
-1	2	4
0	6	12
1	3	6
2	5	10
3	5	10
4	1	2
5	7	14
6	4	8
7	3	6
8	1	2
9	2	4
10	2	4
11	2	4
12	2	4
13	1	2
Total	50	100

Table 3

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Graph 3

Frequency distribution of difference of gestational age determined by LKL from LMP.

Variation in weeks	Frequency	Percentage
-4	1	2
-2	2	4
-1	5	10
0	5	10
1	2	4
2	9	18
3	2	4
4	6	12
5	6	12
6	3	6
8	2	4
9	1	2
11	2	4
12	1	2
14	1	2
Total	50	100

Table 4

Graph 4

CONCLUSION: Kidney length can be considered as an acceptable parameter for the determination of gestational age.

No single parameter could determine the gestational age accurately after 24 weeks of gestation. Hence, none of these parameters are found to be accurate or reliable

Since no fetal parameter from our study is able to determine the foetal gestational age accurately after 24 weeks, a base line scan is essential for accurate dating of pregnancy.

The gestational age should not be determined by the single parameter as recommended by BMUS ultrasonic fetal measurement survey.¹⁷

As the kidney lengths are related to the other parameters in determining the gestational age, they can be used as an adjunct in the determination of gestational age.

Since, in majority of the cases, the left kidney length was greater than right kidney length; both the kidney lengths should be measured.

Accuracy cannot be sacrificed for the cost effectiveness of a single scan.

After 36 weeks, left kidney length can be taken as an acceptable parameter for practical estimation of gestational age.

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