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Comparative analysis of gestational age in singleton pregnancies after 24 weeks using mean fetal kidney length and other Somatographic fetal parameters

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Background and Objective: In order to make precise estimations regarding the age of the fetus and monitor the development of various foetal organs, it is important to possess precise knowledge of the date of birth. Additionally, it aids in the precautionary measures against prenatal and postnatal problems for the neonate. A lack of awareness regarding the last menstrual period (LMP) is a prevalent issue among prenatal mothers. In such circumstances, the computation of the delivery date would pose a challenge. Several studies indicate that as many as 30% of women were uncertain about their Learning Management Plan (LMP). Obstetricians must exercise caution when the precise LMP is unclear to avoid post maturity and preterm deliveries.

Methods: The current investigation constitutes a prospective comparative analysis at the Department of Obstetrics and Gynaecology, SFTMC College & Dr. BR Ambedkar Memorial Teaching Hospital, Agartala, Tripura, India. A sample size of 150 individuals, aged between 20 and 35 years, was included in the study conducted in the year February 2011 to January 2012, specifically after 24 weeks of gestational age. The gestational age was determined through clinical examination by palpating the patient's fundal height. Subsequently, ultrasonography was employed to determine the foetal kidney length (FKL) and other pertinent foetal characteristics.

Results: In this study, the duration of BPD varied from 28 to 40 weeks, with an average BPD of 35.25+2.67 weeks. HC spanned from 27 to 40 weeks, and the average BPD was 35.35+2.88 weeks. MKL ranged from 27 to 41 weeks, with an average MKL of 35.93+3.49 weeks. The combined values of several factors in GA varied from 27.8 to 39.6, with a mean of 3.5.36+2.7.

Conclusion: The FKL is a valuable tool for evaluating gestational age. Based on our research findings, we assert that a notable association exists between the length of the deadly kidney and the gestational age. Therefore, the fetal kidney is a suitable method for estimating gestational age.

Keyword: Gestational age, USG, Fetal kidney, femur length.

INTRODUCTION

Accurate date of birth is essential for determining the fetus's age and tracking the growth of its different organs. Additionally, it aids in the new-born's postnatal and prenatal issues prevention. In many impoverished cultures, it is usual for expectant moms to be unaware about the Latest Menstrual Period (LMP). In such conditions, the task of determining the delivery date would present a considerable challenge. Multiple studies have indicated that as many as 30% of women were uncertain about their LMP. When the exact LMP is not known, the obstetricians providing treatment must take utmost prudence. In order to address this problem, fetal biometry is employed, which quantifies the many anatomical components of fetuses [1].

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Although there are various markers that can be used to determine gestational age, ultrasonography has not yet been able to find a single precise component. To get past this issue, various traits can be employed indirectly to identify the age of the foetus. The biparietal diameter, belly circum-ference, and the lengths of long bones such the femur and humerus are the few parameters that can be used to establish gestational age.

It's vital to get the gestational age right for high-risk pregnancies, especially when the foetus is grown and an early termination is indicated. Accurate prediction of gestational age is crucial for the purpose of adequately preparing for an operational birth, effectively managing various complications, and closely monitoring the growth and development of the fetus. Acquiring the skills to conduct various tests and analyze the results is crucial. Historically, the length of a pregnancy was determined by multiplying the most recent menstrual cycle by 9 months and 7 days, resulting in a total of 280 days. Most women now receive two separate estimations that could be different. One method relies on the most recent menstrual period (LMP), whilst the other method is established using ultrasound assessments of established fetal characteristics. The assessment of gestational age based on the Latest Menstrual Period (LMP): This approach, which has been employed for numerous generations, is highly reliable and readily comprehensible.

The projected date of delivery is calculated by multiplying the initial day of the previous menstrual cycle by a factor of nine months plus an additional seven days [2]. Ovulation may be postponed due to circumstances such as oligoovulation or hormone therapy, leading to inaccurate dates. This tactic possesses drawbacks, akin to every other methodology. The determination of gestational age by clinical procedures. Observing the Pelvis, According to their research, the most reliable way would be to date based on gestational age and rely on accurate menstrual records and pelvic checks during the first trimester. During the initial 12-week period of gestation, ultrasound assessments of the crown rump length exhibit greater precision compared to a clinical evaluation conducted by a seasoned obstetrician. During this pregnancy phase, a proficient obstetrician can get accurate outcomes with an abdominal examination [3].

The Symphysiofundal height (in cms) is approximately equivalent to the gestational age after 24 weeks. Several diseases, including as multiple gestations, intrauterine growth restriction (IUGR), and diabetes pregnancy, have the potential to impact the measurement. The accuracy of Symphysiofundal height in relation to gestational age is 90% within a 6-week timeframe. Orthopaedic ultrasound Obstetric ultrasonography refers to the utilization of medical ultrasound during pregnancy [3].

Ultrasonography has emerged as a valuable diagnostic technique in the field of obstetrics since its initial application in the late 1950s. In the present day, prenatal ultrasound examinations are considered to be safe, non-invasive, accurate, and cost-effective. The SONAR principle, derived from the word "sound navigation and ranging," is employed to denote the aforementioned concept. Ultrasound waves are generated by an inverse piezoelectric action. The piezoelectric effect is a phenomena that arises when crystals, which are considered piezoelectric materials, are subjected to pressure. This mechanical pressure leads to the production of an electric current. In contrast, the application of an electric pulse to a piezoelectric material results in the generation of a mechanical wave, namely an ultrasonic beam. Sound waves are emitted by a transducer that is in contact with the mother's abdomen and is modified to check specific uterine material. The waves undergo reflection upon encountering a tissue interface, at which time they are then processed by the transducer to generate the ultrasonic image observed on the display [4]. Recent research indicates that the length of the fetus's kidneys is a crucial factor in determining the gestational age. This holds particularly true for the period spanning from weeks 24 to 38. The significance of femur length and bi-parietal dimension is greater before 36 weeks compared to head circumference. Historically, FKL measure-ments have been employed for the purpose of detecting fetal kidney abnormalities. Subsequently, the association between gestational age and FKL values was identified. FKL measurements offer the benefit of being unaffected by intrauterine fetal growth retardation. In instances of fetal growth retardation, it has been documented that the renal length (FKL) consistently increases

by 1.7 mm every 15 days throughout the entirety of the pregnancy [5]. The objective of the present investigation was to utilize the average length of the fetal kidney and its juxtaposition with other sonographic data in order to approximate the gestational age of a fetus beyond the 24-week mark.

Materials and Methods

The present prospective comparative study was conducted at the Department of Obstetrics and Gynaecology, SFTMC College & Dr. BR Ambedkar Memorial Teaching Hospital, Agartala, Tripura, India, after approval from the institution's ethics council. A total of 150 pregnant women, aged between 20 and 35, with body mass indexes (BMIs) ranging from 18 to 25 kg/m2, were involved in the study after a gestation period of 24 weeks. After obtaining written informed consent, a comprehensive medical history was obtained from each patient, and their fundal height was assessed through palpation in order to ascertain their gestational age. Ultrasound technology was employed to measure the mean fetal kidney length, head circumference, femur length, belly circumference, and biparietal diameter [6].

When measuring the length in the sagittal plane, both the entire length of the kidney and the renal pelvis are visible. The evaluation of each individual fetal kidney is conducted on a minimum of three occasions, spanning from the upper pole to the lower pole, in order to determine its maximum length. The average of these measurements is then calculated.

Inclusion Criteria

1. Singleton pregnancies occurring after 24 weeks in pregnant moms.
2. Antenatal women who possess accurate knowledge regarding the dates of their most recent menstrual cycle.
3. Pregnant patients without any accompanying risk factors.

Exclusion Criteria

1. Anamolous babies
2. Antenal moms with unclear dates
3. Multiple gestation
4. Associated risk factors such as Diabetes
5. Preeclampsia
6. Eclampsia, chronic renal disorders, obscure adrenal and renal boundaries or margins, and abnormal renal morphology are among the conditions that can be observed.

Results

Table 1: Quantification of distribution based on genetic algorithm

GA LMP	Frequency	Percent
< 32	10	7.0
33-37	60	40
38-42	80	53
Total	150	100.0

Table 2: Presentation

Presentation	Frequency	Percent
Breech	5	7.5
Cephalic	144	91.5
Transverse	1	1.0
Total	150	100.0

Table 3: The establishment of a correlation between several factors and gestational age

		BPD	HC	AC	FL	MKL	POG with MP
LMP GA	R-Value	0.752	0.735	0.72	0.766	0.735	0.832
	P-Value	0.000	0.000	0.000	0.087	0.000	0.000
	N	150	150	150	150	150	150

Table 4: Regression equations

	R	R Square	Constants	
			A	B
BPD GA	0.725	0.695	10.354	0.75
HC GA	0.762	0.635	8.31	0.78
AC GA	0.73	0.651	7.465	0.79
FL GA	0.754	0.554	8.45	0.97
MKL GA	0.754	0.586	7.12	0.78
ML GA	0.768	0.645	9.35	0.76

Table 5: Correlation between gestational age, as determined by LMP, and BPD in different subgroups

GA		Mean	SD	P-Value
< 32	LMP GA	32.45	1.29	0.017*
	POG BPD	32.65	1.95	
33-37	LMP GA	36.45	1.48	0.0002*
	POG BPD	35.65	1.66	
38-42	LMP GA	38.46	0.98	0.0003*
	POG BPD	35.97	1.96	
Overall	LMP GA	36.51	4.34	0.0001*
	POG BPD	35.25	3.13	

Discussion

Accurate determination of the fetus' gestational age is crucial for clinical care, especially in cases of high-risk pregnancies. Pregnancy's characterized by preeclampsia and eclampsia pose a significant danger. Termination of pregnancy may be necessary when the fetus reaches maturity due to unforeseen complications. The majority of screening tests, including biochemical, serological, and ultrasound-based testing, are conducted during a certain stage of pregnancy. There exist certain limitations when employing the most recent menstrual cycle as a means to ascertain the projected date of delivery [7]. Erroneous estimations may arise due to factors such as a poor menstrual history, pregnancy during lactational amenorrhea, first trimester vaginal bleeding, and irregular monthly cycles. The gestational age range for Symphysio fundal height is 24 to 36 weeks, measured in centimeters. Nevertheless, several factors can influence the measurement of gestational diabetes mellitus (GDM), multiple pregnancies, intrauterine growth retardation, transverse fetal lying, gestational pregnancy, and gestational ages ranging from 24 to 36 weeks. The most widely used biometric indices for evaluating fetal gestation are Hadlock-based composite gestational ages assessments. The calculation involves the utilization of measurements for biparietal diameter, head, abdomen, and femur height (FL). Although these biometric indices are widely used, they can be influenced by underlying medical conditions such as intrauterine growth retardation [8]. Furthermore, the authors suggest potential inconsistencies, specifically in the estimation of gestational ages during the third trimester. In situations such as intrauterine growth restriction (IUGR), there is a slight variation in the width and antero-posterior dimensions of the embryonic kidney. Furthermore, no other medical condition significantly affects the duration. During the course of pregnancy, the fetal kidney undergoes continuous growth at a rate of 1.7mm, without any observable growth abnormalities or disruptions. The present study, entitled "Comparative investigation of gestational age estimation using mean fetal kidney length and other sonographic foetal parameters in singleton pregnancies after 24 weeks", was undertaken to estimate the gestational age of the fetus beyond 24 weeks using mean fetal kidney length. This approach was chosen due to insufficient data available across the trimesters [8].

The study included participants aged between 20 and 35 years, with an average age of 24.41+3.79 years. The study revealed that among the participants, 43% were classified as multiparous, while 57% were categorized as primiparous. In the conducted study, it was found that 27.5% of pregnant women obtained confirmation of USG, whereas 72.5% obtained confirmation of UPT. 7.5% of the patients had breech presentation, 91.5% had cephalic presentation, and 1% had transverse lay. The mean gestational age (GA) was observed based on multiple parameters. It is of utmost importance to have a clear understanding of the fetal gestational age (GA) in order to effectively manage obstetric patients. This importance cannot be overstated [9]. In order to make a well-informed decision on obstetric treatment, it is necessary to possess a comprehensive understanding of the real gestational age. An accurate FGA estimate provides appropriate planning for the delivery style and postoperative care of the new-born. Additionally, it aids in the assessment and diagnosis of intrauterine growth retardation as well as guiding pregnant mothers who are at a high risk of premature birth (IUGR).

Unknown gestational age has been related with a poor pregnancy outcome, including low birth weight, spontaneous early labours, and perinatal death rates. Haines underlined that the fetus is at risk when there is a cloudy LMP date mixed with any obstetrically high-risk scenario (such as placenta previa and pregnancy-induced hypertension (IUGR) due to the issue of determining when to deliver the baby). The last menstrual period (LMP), ovulation date, conception date (in cases of artificial insemination), quickening, ultrasonography, and symphysis fundal height are some of the techniques used to calculate FGA. The use of ultrasonography in obstetrics practise and FGA estimate are both essential. Sonographic estimates of gestational ages are made using calculations based on fetal measurements. This works as a supplemental indicator [10]. In order to establish the association between fetal biometric data, various equations have been devised. They are a legitimate and impartial way of

determining FGA. These biometric measurements include: Femur length, Head circumference, Abdominal circumference, Biparietal diameter, Crown rump length, and Gestational sac (FL). Obstetricians encounter considerable difficulties in accurately assessing fetal growth assessment (FGA) using ultrasound, particularly as the pregnancy approaches full-term [11]. This problem is often exacerbated as the pregnancy progresses due to an augmentation in the biological diversity of the fetal DNA. Several variables, such as maternal age, parity, and pregnancy weight, have the potential to contribute to these variances. As pregnancy approaches term, technical factors such as interobserver error or different measuring procedures have the potential to heighten fetal variability.

Benson *et al*. further supported this conclusion by emphasizing that as the pregnancy advances into the third trimester, the accuracy of these traditional indicators of FGA (GS, CRL, BPD, HC, AC, and FL) begins to decrease. Butt and Konje *et al*. proposed the integration of multiple biometric parameters for the determination of Fetal Growth Assessment (FGA) during the third trimester, as opposed to relying solely on a single biometric parameter. Ansari *et al*. and Konje *et al*. found that the fetal kidney length (FKL) is a more accurate indicator of gestational age compared to other fetal biometric indices such as BPD, HC, FL, and AC, within the gestational period of 24 to 38 weeks [11]. The foetal kidney can be reliably measured between weeks 14 and 17 of pregnancy using transvaginal sonography (TVS), and starting at week 18 using trans abdominal ultrasonography. Ansari *et al*. observed minimal disparity in the length of embryonic kidneys in Asians when compared to previous investigations conducted on Caucasians. This observation potentially highlights the ethnic heterogeneity within the study cohort, thereby elucidating Degan's recommendation to assess a comprehensive array of epidemiological variables pertaining to prenatal development and employ tailored charts for different populations, whenever accessible. Kurtz *et al*. (year) assert that despite the existence of numerous established charts with a longstanding history, researchers occasionally encounter substantial demographic disparities that necessitate the development of nomograms for other racial groups. Consequently, the present study becomes imperative in addressing this issue.

In the present study, the average age recorded was 36.51±3.20 weeks, whereas the gestational age determined by LMP varied between 28 and 41 weeks. GA exhibited a range of 27.8–39.6 and a mean of 35.36±2.72, determined by a combination of various factors. The present study examines the comparability between GA and LMP GA across various parameters. Specifically, the mean LMP GA observed during the initial 32-week period was 30.68+1.28. Similarly, the mean POG BPD observed during the subsequent 33-37 weeks was 35.29+1.47, while the mean POG BPD observed during the subsequent 38-42 weeks was 36.51+3.20. Across the four research pregnancy trimesters, both metrics revealed a statistically significant connection. In the current study, the mean LMP GA observed during the first 32 weeks was 30.68±1.28, and the mean POG HC seen during the next 33–37 weeks was 35.29±1.47, and the mean POG HC observed during the next 38–42 weeks was 36.51±3.20, and the mean POG HC was 35.35±2.88. Overall, the LMP GA was 36.51±3.20, and the POG HC was 35.35±2.88. The mean age seen during the first 32 weeks of the study was not statistically different from the mean age determined later in the pregnancy based on the HC, which differed considerably from the mean age predicted based on LMP GA [15, 16]. In the current study, the mean LMP GA observed during the first 32 weeks was 30.68±1.28, and the mean POG AC seen during the following 33–37 weeks was 35.29±1.47, and the mean POG AC observed during the following 38–42 weeks was 39.21±0.89. Overall, the LMP GA was 36.51±3.20, while the POG AC was 35.05±3.07. In the current investigation, there was no statistically significant difference between the mean age determined using AC during the first 32 weeks of pregnancy and the mean age determined using AC towards the end of the pregnancy when compared to the mean age determined using LMP GA. In the current study, the mean LMP GA observed during the first 32 weeks was 30.68±1.28, and the mean POG FL observed during the following 33–37 weeks was 35.29±1.47, and the mean POG FL observed during the following 38–42 weeks was 39.21±0.89, and the POG FL was 37.08±2.07. Overall, the LMP GA

was 36.51±3.20, while the POG AC was 35.25±2.99 [12].

In the current investigation, there was no statistically significant difference between the mean age determined using FL during the first 32 weeks of pregnancy and the mean age determined later in pregnancy when compared to the mean age determined using LMP GA. In the current study, the mean LMP GA observed during the first 32 weeks was 30.68±1.28 and the POG MKL was 31.54±3.48. During the following 33–37 weeks, the LMP GA observed was 35.29±1.47 and the mean POG MKL observed was 34.74±1.96. Finally, during the following 38–42 weeks, the mean LMP GA observed was 39.21±0.89 and the POG MKL was 38.18±2.68, In the current investigation, it was found that the mean gestational age assessed using the MKL and the gestational age estimated using the LMP differed statistically significantly [18,19]. In the current study, the mean LMP GA observed during the first 32 weeks was 30.68±1.28, and the mean POG MP seen during the following 33–37 weeks was 35.29±1.47, and the mean POG MP observed during the following 38–42 weeks was 39.21±0.89, and the POG MKL was 37.25±1.65. Overall, the LMP GA was 36.51±3.20, while the POG AC was 35.45±2.99. In the current experiment, it was found that the mean gestational age assessed using the MKL and the gestational age calculated using the LMP differed statistically considerably. The search for the most exact biometric marker that can predict gestational age has risen as the pregnancy approaches closer to term. Campbell's criteria that FGA be estimated with little biological variance, simple measurement, and high reliability must be met by this biometric parameter. The fetal kidney can be readily observed and quantified [13].

The right FKL displayed a very excellent concordance correlation between sonographers, with a coefficient of 0.977 between sonographers and a coefficient value of 0.977 within sonographers, according to the pilot experiment to verify inter ratter reliability. The concordance coefficients for the left FKL were found to be 0.995 and 0.990, respectively, among the sonographers. The interclass correlation coefficient is 0.996. These results demonstrate that the measures of the embryonic kidneys meet the Campbell criteria for robust consistency among and across raters. In order to provide more evidence for the finding, the infraclass correlation was evaluated using the analysis of variance (ANOVA) model. The obtained coefficient of 0.989 demonstrates a high level of excellence, rendering it suitable for therapeutic applications. The Bland Altman plot demonstrates a significant deviation of the values from zero. The findings indicate that as FGA increases, both FKLs exhibit a linear increase. At 20 weeks of pregnancy, the left fetal kidney length (FKL) increases from 2.100.37 cm to 4.750.29 cm, whereas at 40 weeks, the right FKL extends from 2.040.38 cm to 4.740.26 cm. This finding is consistent with previous studies63, which shown a positive correlation between FKL and FGA. The positive correlation between FKL and FGA indicates that FKL is a dependable predictor of FGA during the third trimester [14]. Konje *et al*. found that FKL is a superior technique for determining FGA compared to the biometric indices of BPD, HC, FL, and AC during the gestational period of 24 to 38 weeks. This phenomenon could potentially explain the observation that both FKLs exhibit a modest yet favorable correlation with other biometric parameters, which tend to diminish in efficacy as pregnancy progresses towards full term. The left front-upper quadrant (FKL) exhibits significant correlations with FL (0.379, $p<0.01$), BPD (0.343, $p<0.01$), AC (0.396, $p<0.01$), and HC (0.311, $P<0.01$). However, no significant correlations were seen with other biometric parameters (0.360, $p<0.1$), BPD (0.323, $p<0.01$), AC (0.379, $p<0.01$), or HC (0.311, $P<0.01$). (0.331, $p<0.01$). The determination of gestational age plays a pivotal role in determining the projected date of birth during the initial trimester, as well as evaluating the progress of fetal development during the subsequent trimesters. Previous study has extensively examined the heterogeneity in FKL-based gestational age estimation. A linear correlation was seen between the gestational age, measured in weeks, and the length of the fetal kidney, measured in millimeters.

This inquiry was undertaken to examine potential variances within the Indian population. There are multiple methodologies for ascertaining gestational age, one of which involves the utilization of the LMP and crown rump length during the initial

trimester. As the pregnancy progresses, fetal biometric measures such as Biparietal Diameter (BPD), Head Circumference (HC), Abdominal Circumference (AC), and Femoral Length (FL) have gained widespread acceptance as reliable indicators for predicting gestation age on a global scale. Nevertheless, the potential for inaccuracies in these parameters increases as the gestation progresses, particularly during the third trimester, so rendering them potentially inaccurate. Additional measures, such as fetal foot length and fetal kidney length, have been suggested for the determination of gestational age. Multiple studies have determined that the average length of the fetus's kidneys is the most reliable measure for accurately determining gestational age. Ozat *et al*. found a high association between GA and sacral length, which suggests that fetal sacral length can be used to determine the timing of labor. Furthermore, further investigation has revealed a significant correlation between components such as BPD, HC, AC, and FL and GA. However, the determination of these parameters necessitates a high level of skill in ultrasonography.

The present investigation revealed that the FKL parameter exhibited the highest level of accuracy in determining gestational age. The aforementioned findings are substantiated by a study conducted by Kansaria *et al*., which showcased the enhancement of labour dating through the utilization of the FKL parameter. According to a study conducted by Das *et al*., the length of the kidney can serve as a reliable indicator for estimating gestational age. The intercept and regression coefficient (slope) were compared between the present study and other previous investigations, as indicated in the aforementioned table.

The present study revealed a positive Pearson's correlation and regression coefficient between kidney length and gestational age, which differs from previous research. The Cohen *et al*. investigation involved the sonographic measurement of fetal kidney lengths during pregnancy. Gestational ages were determined through the utilization of biometry and the latest menstrual cycle. There exists a statistically significant correlation (r=0.82) between gestational age and renal length. This was determined using the biparietal dimension, femoral size, and abdominal circumference. An average was calculated by combining these three measures. No noticeable disparity in the lengths of the right and left kidneys was observed in fetuses whose kidneys were examined. The renal lengths vary significantly between different gestational ages (p<0.001). The objective of the study conducted by Konje *et al*. was to evaluate the precision of kidney length measurement in estimating gestational age over the period spanning from the 24th to the 38th weeks of pregnancy. Additionally, the researchers aimed to compare this measurement with other fetal biometric indicators [15]. A total of 73 singleton, uncomplicated pregnancies were subjected to conventional ultrasonography fetal biometry and kidney length measurements at regular intervals of 2 weeks, spanning from 24 to 38 weeks of gestation. The most precise models utilized for the computation of gestational ages during the later stages of pregnancy encompassed various factors such as kidney length, biparietal dimension, head circumference, and femur circumference. The predictive accuracy of the model was 8.48 days, and it accurately estimated gestational ages. The standard error for predicting gestational age was found to be 8.57 days when the model incorporated variables such as kidney length, biparietal dimension, head circumference, and femur height. The performance of these models was somewhat superior to those obtained using biometric indices such as biparietal size, head circumference, and femur height (+9), biparietal dimension, head circumference, and femur diameter (9.45), and biparietal and femur sizes (9.9). The kidney length and femur size demonstrated the most accuracy in predicting gestational age, with values of 10.29 and 10.96 days, respectively, using simple linear regression models. Conversely, the abdominal circumference exhibited the lowest accuracy, with a value of 14.54 day.

Toosi and Rezaie conducted a study called Delu's examination to determine the average length of the growing kidney (KL) and its correlation with gestational age (GA). A total of 92 pregnant women, who were in the eighth to tenth weeks of a typical singleton pregnancy, participated in cross-sectional investigations. The female participants had standard fetal biometry ultrasounds and measurements of renal distal length. A study was

conducted to examine the impact of GA on KL and other fetobiometry parameters using both multivariate and univariate linear regression analysis. There was a significant correlation (r = 0.83) between GA and KL. Combining head circumference, fetal biparietal diameter, and femur length proved to be the most precise method for predicting GA. In conjunction with a standard error (SE) valued at approximately 14.2 days. The results of this study indicate that the utilization of KL measurements in conjunction with other fetal biometric factors can yield a more accurate prediction of gestational age. The study conducted by Shivalingaiah *et al*. revealed a significant positive correlation (r=0.85) between fetal kidney length and gestational age during the late trimesters, especially in cases of intrauterine growth restriction (IUGR) in fetuses. The study examined the correlation between kidney size and gestational age. A total of 60 pregnant women, ranging in age from 24 to 36 weeks, were included in the study. Prenatal dating was reliably determined by early dating scans. The renal organ that exhibited the closest proximity was quantified in millimeters. Furthermore, the assessment was conducted on a weekly basis, in conjunction with many other biometric measurements. Based on the observations, KL exhibits the smallest deviation from the expected gestational age [15]. This indicates that the other biometric parameters measured by ultrasonography and the observed length of the kidney were almost indistinguishable.

The objective of the study conducted by Chatterjee *et al*. was to evaluate the length of the fetus's kidneys as a means of predicting gestational age in pregnancy through the utilization of ultrasound technology. This study involved the participation of 100 pregnant women with diverse ages and due dates. Based on the results, it can be observed that KL exhibits the least amount of week-to-week volatility in gestational ages. The results indicated that there was no significant difference between kidney length and other biometric measurements obtained via ultrasonography.

Conclusion

The study concluded that kidney length could be used as a standalone predictor of gestational age, particularly in the later trimesters when biometric indications may be less reliable. There is a substantial relationship between gestational age and fetal kidney length. The utilization of fetal kidney for the determination of gestational age has demonstrated significant utility.

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