

# Estimation of Gestational Age for Sudanese in 2<sup>nd</sup> and 3<sup>rd</sup> Trimester

Dr. Elsir Ali Saeed Taha<sup>1</sup>

<sup>1</sup>national University, college of radiographic and medical imaging, Khartoum, Sudan  
author1[at]email.com

**Abstract:** A descriptive-cross sectional study aimed to estimate gestational age in normal Sudanese pregnant women in order to develop a linear equation that can be used to estimate the GA based on ultrasound measurement. The data collected in Elragi Hospital (Khartoum) and Elribat teaching hospital from January 2016 to January 2017; 232 pregnant women in second and third trimesters were scanned by ultrasound machine Toshiba-power vision-6000. Ultrasound measurement was done for GA-LMP, BPD, fetal FL, and AC, which having mean± SD of (29.9±6.7week), (72.4±16.5mm), and (54.5±15mm), (237.6±66.2mm) respectively. A strong direct correlation was noted between all parameters and GA-LMP (gestational age from the date of last mensuration).

**Keywords:** GA-LMP, mensuration, ultrasound, pregnancy.

## 1. Introduction

The accurate dating of pregnancy is critically important for pregnancy management from the first trimester to delivery, and is particularly necessary for determining viability in premature labor and in post-dates deliveries (Kalish and Chervenak 2005). Prior to the widespread use of ultrasound, caregivers relied on a combination of history and physical examination to clinically determine gestational age. Ultrasound gave clinicians a method to measure the fetus and therefore to estimate gestational age. Much of our current clinical practice is based on studies from the 1980s and 1990s. As new information emerges in fields, such as reproductive biology, perinatal epidemiology, and medical imaging, our current clinical practice is being challenged. "Certain" menstrual dating, for example, is less certain than previously thought.

When ultrasound is performed with quality and precision, there is evidence to suggest that dating a pregnancy using ultrasound measurements is clinically superior to using menstrual dating with or without ultrasound, and this has been advocated and adopted in other jurisdictions. Hughes et al. (2008) and Salomon et al. (2013).

The clinical estimate of gestational age typically relies on clinical history (menstrual cycle length, regularity, and recall of the first day of the last menstrual period), followed by confirmation by physical examination or other signs and symptoms. Andersen et al. (1981) and Nguyen et al. (1999).

Dating by certain menstrual history is inexpensive and readily available. Typically, the EDD is based on a 280-day gestation from the first day of the LMP. Certain menstrual dating criteria assume regular cycles, ovulation at the midpoint of the cycle, fertilization on the middle day of the cycle, correct recall of the onset of the LMP, and the woman having been free of oral contraceptives for several months prior. Women vary greatly in their awareness of their internal functions, including ovulation. Their self-knowledge of ovulation can sometimes be very accurate; however, the only truly certain clinical history is one in which the dates of

ovulation, fertilization, and implantation are precisely known, as in ART, in which records include the date of oocyte retrieval, and other methods of timed ovulation and fertilization. Unfortunately, without timed ovulation and fertilization as in ART and other timed methods, clinical history is often not reliable. Johnson et al. (2002). Campbell et al. (1985) demonstrated that 45% of pregnant women are uncertain of menstrual dates as a result of poor recall, irregular cycles, bleeding in early pregnancy, or oral contraceptive use within 2 months of conception.

In the second and third trimesters, estimation of gestational age is accomplished by measuring the biparital diameter, head circumference, abdominal circumference, and femur length. These measurements are only as good as the quality of the images. Optimal imaging can be difficult in some clinical situations, such as in a late pregnancy abnormal lie when the head is deep in the maternal pelvis, maternal obesity, or multiple gestation. Normal biological variation appears to have more influence on measurements in the second and third trimester. Thus, in the second half of pregnancy these measurements are less reliable than first trimester CRL, and they become increasingly inaccurate as gestation progresses Caughey et al. (2008) and Nyberg (2003) Maternal and fetal pathology may affect them, so their inclusion or exclusion in the determination of gestational age requires clinical judgment.

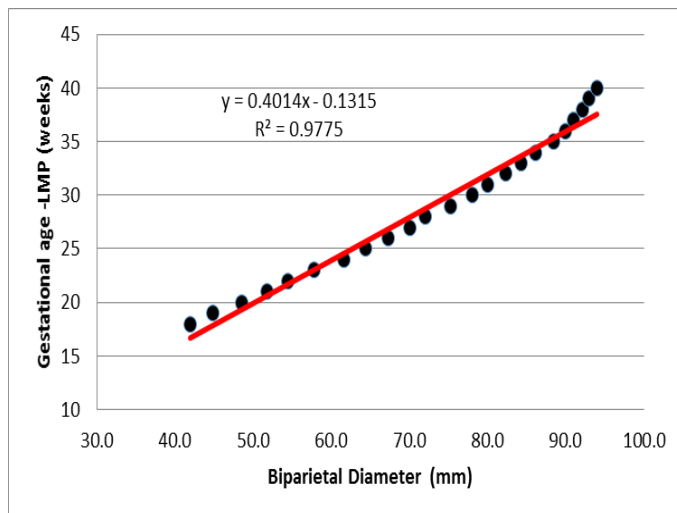
This study was aimed to investigate the role of ultrasound in evaluation and estimation of gestational age for Sudanese women using ultrasound, in which LMP date was used as reference stander for the estimation of such age.

## 2. Material and methods

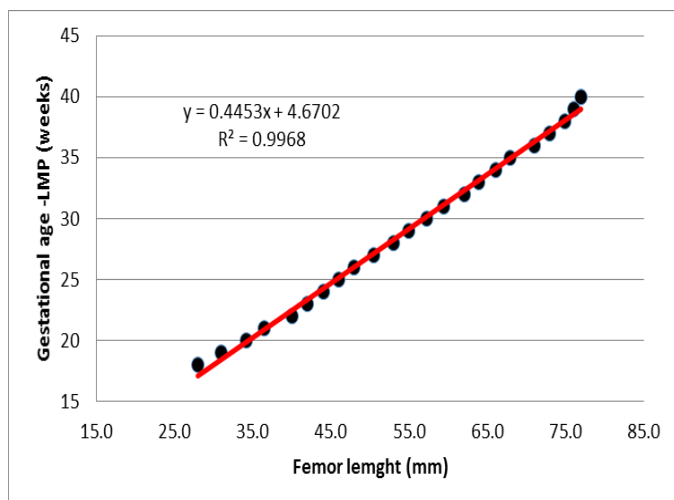
The data from 232 pregnant Sudanese women were evaluated retrospectively during this study in period from January 2016-Till January 2017. Ultrasonography evaluation was conducted by Dr. Elsir Ali Saeed and proof Mohamed Elfadil. Women with multiple gestations, diabetes, or growth disorders such as intrauterine growth retardation were excluded. Cross-sectional measurement of each case were

used for assessment of GA using the date of LMP. And the birth weight (BW). Biparietal diameter (BPD) was measured in axial plane at the level where the continuous midline echo is broken by the septum pellucidum cavum. Measurement were made from the outer to inner margin of the fetal skull. The abdominal circumference (AC) was measured directly by a plot on transfers section through the fetus abdomen at the level where the umbilical vein and stomach bubble were seen. The femur was measured from the origin to the distal end of the shaft. Then the correlation was developed to assess the relation between the LMP GA and these measurements as follow.

### 3. Result Presentation



**Figure 1:** scatter diagram showed the relation between BPD (x) and GA (y).



**Figure 2:** scatter diagram showed the relation between FL (x) and GA (y).

**Table 1:** statistical measure for study variables

Variables	Mean	Std. Deviation
GA_LMP	28.9	6.7
BPD	72.4	16.5
FL	54.5	15
AC	237.6	66.2

### 4. Discussion

The purpose of this study was to estimate the GA in normal Sudanese pregnant women using ultrasound measurement. The research includes 232 pregnant women. The variables used to establish this study was GA-LMP, BPD, fetal FL, and AC, which having mean± SD of (29.9±6.7week), (72.4±16.5mm), and (54.5±15mm), (237.6±66.2mm) respectively.

Gestational age were correlated with Biparietal distance in order to develop a linear equation that can be used to estimate the GA without calculation. This correlation reveals that GA using LMP was strongly correlated with BPD where its increased by 0.4014 week for every one mm increment in BPD  $y = 0.4014x - 0.1315$ ,  $R^2 = 0.9775$ . As in figure (1). The BPD is less reliable in determining gestational age when there are variations in skull shape, such as dolichocephaly or brachycephaly; hence some authors feel that BPD is less reliable than HC. As state by Nyberg (2003). And others.

During the 3rd trimester and the 2nd one the FL and PBD is one of the useful method in estimation of GA relative to the real GA using LMP calculated from last day of menstruation which consider as first day of gestation. This study was aimed to estimate these ages using the FL and BPD measurement, the correlation was made between the GA and FL also direct relationship noted strongly between the FL and BPD in which the GA increased by 0.4453 week for every on (mm) increment in FL.  $y = 0.4453x + 4.6702$ ,  $R^2 = 0.9968$  as in figure (2).

Femur length varies somewhat with ethnicity. Short femurs are commonly a normal variant, however this finding may also indicate fetal growth restriction, aneuploidy, and—when severely shortened—skeletal dysplasia. Nyberg (2003).

Note that Dating by certain menstrual history is inexpensive and readily available. Typically, the EDD is based on a 280-day gestation from the first day of the LMP. Certain menstrual dating criteria assume regular cycles, ovulation at the midpoint of the cycle, fertilization on the middle day of the cycle, correct recall of the onset of the LMP, and the woman having been free of oral contraceptives for several months prior. Women vary greatly in their awareness of their internal functions, including ovulation.

### 5. Conclusion

The above results indicate that the ultrasound can be used for better estimation of the GA when comparing these measurements with the real fetal age. This help to know the normality of fetal weight or predicting any abnormalities such as intrauterine growth retardation (IUGR). It has been realized that with the same measure there are different estimations of fetal age. We think that is due to normal variations between pregnancies and due to small volume of cases included in the study. This study reveals a significant difference among the study variable and strong correlation between the GA and the fetal measurement.

## References

- [1] Kalish RB, Chervenak FA. Sonographic determination of gestational age. *Ultrasound Rev Obstet Gynecol* 2005;5:254–8.
- [2] Hughes R, Aitken E, Anderson J, Barry C, Benton M, Elliot J; National Institute for Health and Clinical Excellence. Antenatal care. Routine care for the healthy pregnant woman. NICE clinical guideline 62. London: RCOG Press; 2008.
- [3] Bottomley C, Bourne T. Dating and growth in the first trimester. *Best Pract Res Clin Obstet Gynaecol* 2009;23:439–52.
- [4] Gardosi J. Dating of pregnancy: time to forget the last menstrual period. *Ultrasound Obstet Gynecol* 1997;9:367–8.
- [5] Gardosi J, Geirsson RT. Routine ultrasound is the method of choice for dating pregnancy. *Br J Obstet Gynaecol* 1998;105:933–6.
- [6] Salomon LJ, Alfirevic Z, Bilardo CM, Chalouhi GE, Ghi T, Kagan KO, et al. ISUOG practice guidelines: performance of first-trimester fetal ultrasound scan. *Ultrasound Obstet Gynecol* 2013;41(1):102–13.
- [7] Andersen HF, Johnson TR Jr, Flora JD Jr, Barclay ML. Gestational age assessment. II. Prediction from combined clinical observations. *Am J Obstet Gynecol* 1981; 140(1):770–4.
- [8] Andersen HF, Johnson TR Jr., Barclay ML, Flora JD Jr. Gestational age assessment. I. analysis of individual clinical observations. *Am J Obstet Gynecol* 1981; 139: 173–7.
- [9] Nguyen TH, Larsen T, Engholm G, Moller H. Evaluation of ultrasound-estimated date of delivery in 17,450 spontaneous singleton births: do we need to modify Naegele's rule? *Ultrasound Obstet Gynecol*. 1999; 14: 23–8.
- [10] Johnson TR, Niebyl JR. Preconception and prenatal care: part of the continuum. In: obstetrics: normal and problem pregnancies. 4th ed. Philadelphia: Churchill Livingstone; 2002.
- [11] Campbell S, Warsof SL, Little D, Cooper DJ. Routine ultrasound screening for the prediction of gestational age. *Obstet Gynecol* 1985; 65: 613–20.
- [12] Caughey AB, Nicholson JM, Washington AE. First- vs second-trimester ultrasound: the effect on pregnancy dating and perinatal outcomes. *Am J Obstet Gynecol* 2008; 198: 703–5.
- [13] Nyberg DA. Diagnostic imaging of fetal anomalies, 2nd ed. Philadelphia: Lippincott Williams Wilkins; 2003: pp 32–4.