



CODEN [USA]: IAJ PBB

ISSN: 2349-7750

**INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES**<http://doi.org/10.5281/zenodo.2559206>Available online at: <http://www.iajps.com>

Research Article

**ESTIMATION OF THE GESTATIONAL AGE ACCORDING TO
CROWN-RUMP LENGTH USING ULTRASONOGRAPHY FOR
SAUDI WOMEN IN AL AHSA**¹ Fetoun A M ALAjmi, ²Asma Mohanna AlHubail, ³ Afnan Khalifah Al-Barjas, ⁴Reem Ahmed Alyahya, ⁵Wala'a Tawfeeq Bu-sa'ad

¹ Medical intern, College of Medicine, King Faisal University, Al Ahsa, Saudi Arabia, ²General surgery resident, Imam Abdulrahman bin Faisal university hospital, Dammam, Saudi Arabia., ³ General surgery resident, Omran General Hospital, Al Ahsa, Saudi Arabia, ⁴General Surgery resident, King Abdulaziz Hospital, Al Ahsa, Saudi Arabia, ⁵Internal medicine resident, King Abdulaziz Hospital, Al Ahsa, Saudi Arabia.

Abstract:

Background/Objective: This study was performed to identify pregnancy outcome in a population of Saudi women with good documentation of the last menstrual period [LMP] to construct an institution specific CRL model and to compare its ability in predicting gestational age [GA] with previously published nomograms in order to determine correct gestational age and to compare with other studies to demonstrate variation, if any, and to assess the relation between CRL and GA.

Methods: A CRL parameter was established for gestational age estimation of 30 singleton fetuses in Saudi Arabia-AL Ahsa populations. Measurements were obtained by placing the calipers of the ultrasound machine from the crown to the rump. The obtained measurements were compared to previously published nomogram to determine if Saudi populations need a different nomogram measurement. Correlation coefficient and P value were measured.

Result: The CRL corresponds to Rampen's nomogram from 8-10 weeks. There is addition of 3 mm at weeks 7. Also, CRL and GA p value and correlation coefficient were highly significant.

Conclusion: The measurement obtained for Saudi women were comparable with the previous published nomograms with minimum difference. And the study proved that CRL is strongly correlated with GA.

Keywords: CRL, GA, LMP, crown-rump length, gestational age

Corresponding author:**Fetoun A M ALAjmi,**

Medical intern, College of Medicine, King Faisal University, Al Ahsa

QR code



Please cite this article in press Fetoun A M ALAjmi et al., *Estimation Of The Gestational Age According To Crown-Rump Length Using Ultrasonography For Saudi Women In Al Ahsa.*, Indo Am. J. P. Sci, 2019; 06[02].

INTRODUCTION:

Pregnant women require routine prenatal care to help ensure the health of the fetus [1]. Because fetal growth is a dynamic process that has to be monitored over a period of time [2]. The pregnant women need this care especially in the first trimester, which is the first 12 weeks of the pregnancy. This importance came from the fact that Spontaneous pregnancy loss occurs in 25% to 50% of pregnancies prior to 14 weeks of gestation [3]. First trimester growth restriction is associated with an increased risk of adverse birth outcomes [preterm birth, fetal aneuploidy low birth weight and small for gestational age at birth].[4]. Accurate dating of pregnancy is critical to the quality of the national screening programme for Down's syndrome. Combined with that, Accurate dating of gestational age is central to good obstetric care. It allows the clinicians to better time gestation-specific antenatal screening tests, reduces erroneous labelling of pregnancies as very preterm, preterm, and small-for-gestational-age, and decreases the risk of inappropriate induction of labour[5]. So monitoring fetal growth during the first trimester of pregnancy is expected to be of significant value in assessing complications in pregnancy [6].

Gestational age [GA] is defined as the conceptual age plus two weeks. By convention, pregnancies are dated beginning from the first day of LMP [last menstrual period]. In women with a regular 28-day cycle, conception occurs approximately 2 weeks after LMP. In these women, GA and menstrual age are the same [7]. Prior to the widespread use of ultrasound in early pregnancy, first trimester growth was thought to be uniform and under genetic control. Differences in fetal growth rates were not believed to manifest until the second half of pregnancy. However, these beliefs were challenged after analysis of data from thousands of first trimester ultrasound examinations [8].

To measure the gestational age using ultrasonography, the physicians make some measurement for the fetus in the first trimester, and this is called FIRST TRIMESTER SCREENING, and it includes: GESTATIONAL SAC, which is the earliest sonographic finding in pregnancy. YOLK SAC, it appears during the 5th week. It is the second structure to appear after the GS. CROWN RUMP LENGTH [CRL] and it is a reproducible and accurate method for measuring and dating a fetus[9]. Sonographic determination of GA is becoming increasingly important. Many parameters may be used for establishing GA. The crown-rump length [CRL] is a reliable parameter for estimating gestational age in the first trimester [10]. And this

parameter [CRL] will be used in this research. In Saudi Arabia many women don't know the exact date of their LMP, so they also calculate the GA wrong, and as mentioned above the importance of knowing the GA and the risks that the fetus may encounter during the first trimester. Also, not knowing the exact date of LMP will lead to calculate the expected date of delivery wrong, since that each level of pregnancy needs its own management, the risk of this wrong calculation will be high. Considering all these facts, in this research we will confirm the accuracy of CRL as a reliable parameter for GA estimation in Saudi women population of Alhassa. The research will also try to see whether a nomogram is required for Saudi women or not.

SUBJECTS OF STUDY AND METHOD:

This study was carried out after obtaining permission from the higher authorities of King Faisal University medical college. This research is a retrospective research conducted in King Faisal university health center in Al Ahsa, on 30 participants, who came for ultrasonography in Gynaecology Department from January 2012 to, January 2013.

The research has been done by collecting data using a data collection sheet that contains specific parameters, including: age, CRL, gestational age, LMP. The research sample was 30 women in the first trimester of pregnancy.

The inclusion criteria included:

- 1- Women under the age of 40
- 2- Regular menstrual cycles [26–30 days] prior to pregnancy
- 3- Known LMP date.
- 4- Diagnosis of pregnancy by blood test or urine pregnancy test

The exclusion criteria included:

1. Multiple gestations
2. Maternal complications—hypertension, abnormal glucose tolerance test, diabetes mellitus.
3. Patients treated for infertility

The measurements were achieved with a commercially available ultrasound, equipped with a 7 MHz transducer [Sonace9900 prime the multibeam3D Ultrasound system]. The procedure was explained to the participants and it was performed in the supine position with both hip and knees in extension. The probes were held with the right hand and to decrease the inter-observer variability, the same sonologist performed all the measurements in millimeters.

Statistical analysis:

SPSS 17.1 for windows was used for data analysis.

The GA was assessed for each given CRL measurement and the differences of the performance in the prediction of GA between our model and the previously published nomograms were compared. The other published nomograms were of Robinson,

Hadlock, Tokyo, Rempen, Osaka, Daya, Hansman and Nelson. The range of CRL, the Average of CRL and p value of significant, correlation coefficient and S.D. were assessed for the given values.

RESULTS:

Table [1]. General statistics for the research data.

Gestational Age in weeks	No. of observations	Range of CRL in cm	Average CRL in cm	S.D.
6	4	.27	.775	.127
7	11	.41	1.14	.106
8	8	.31	1.85	.106
9	4	.45	2.47	.184
10	3	.48	3.25	.241

Table [2]. Important Percentile Values of CRL in Different Gestational Weeks

GA [week]	No. of patients	CRL Percentiles		
		5	50	95
6	4	6	8	9
7	11	10	11	13
8	8	17	18	20
9	4	22	24	29
10	3	30	32	34

Table [3]. Comparison of CRL in Correlation with GA in Different Studies

Parameters studied	Correlation coefficient [r]	P value	Remark
Gestational age and CRL	.97	< 0.001	Highly significant

Table [4]. Correlation coefficient and p value for the parameters studied [GA and CRL].

Predicted GA [weeks]	CRL 50th Percentile [mm]									
	Current study	Nepal	Robinson	Hadlock	Tokyo	Rempen	Osaka	Daya	Hansman	Nelson
6	8	-	-	-	-	-	-	-	-	-
7	11	-	10	10	-	9	9	8	11	-
8	18	16	16	16	14	17	13	15	13	10
9	24	23	22	23	21	25	20	23	18	22
10	32	30	32	32	29	34	30	31	26	32

Image [1]: an ultrasound scan showing gestational sac and yolk sac.

A total of 30 pregnant women who fit the inclusion criteria for this study. All the women were from the same geographic area, which is AL-Hassa. As it's mentioned in the method by using SPSS 17.0, Differences of the performance in the prediction of GA between this research model and the previously published nomograms were compared. These published nomograms were of Nepal ,Robinson, Hadlock, Tokyo, Rempen, Osaka, Daya, Hansman and Nelson. The duration of pregnancy at the time of

examination according to LMP range from 6-10 weeks. Table1 shows a general statistics for the research data including the gestational age in weeks No. of observations, Range of CRL in cm, Average of CRL in cm and Standard deviation. In [Table 2], the predicted CRL for the 5th, 50th and 95th percentiles were calculated for each GA. The Measurements of the 50thpercentiles were compared to those of other studies [Table 3], to assess the relation between GA and CRL, correlation coefficient

and p value were measured and the result was highly significant, indicating that these two variables are strongly correlated [Table 4].

DISCUSSION:

The estimated date of delivery is usually based on the patient's recalling of the date of LMP. Precise knowledge of the LMP should also help the obstetrician avoid postdate pregnancy and its attendant risks to the fetus[6]. Knowledge of the LMP helps the sonologist recognize the growth retarded or macrosomic fetus. In the case of Saudi women, this is going to be difficult since that there are some mistakes in calculating the LMP date or difficulty in recalling it. And there is a significant importance of knowing this date for the obstetrician to estimate the EDD. With the development of ultrasonography this problem is almost solved. And based on previous researches and studies; the CRL in the First trimester is proved to be the most accurate method of assessing the GA in the normal gestations [10].

According to Table 3, the nomogram that most closely corresponds to the CRL in this study starting from the seventh week up to the tenth week is Rampen's[6]; the differences are: there is an addition of 2.7 mm in the 7th week, and an addition of 0.8 mm in the 8th week. Also there is a deficiency of 1.4 in the 9th week, and a deficiency of 0.15 in the 10th week. This variation may be influenced by maternal factors such as age, smoking, and folic acid intake. Also it may be due to the sample size.

And according to table 4 the CRL and GA are strongly correlated.

The final findings that we conclude of our research were:

- 1- Many parameters may be used for establishing GA, but the crown-rump length [CRL] is a reliable parameter for estimating gestational age in the first trimester.
- 2- High degree of positive correlations between CRL and GA were present.
- 3- Crown Rump Length [CRL] show linear growth as gestational age advances; also indicate the strong correlation.
- 4- There is a need to have separate nomogram for Saudi women in AL Ahasa.
- 5- This data may be useful in the early detection of genetic or environmental disorders affecting fetal growth in the first trimester of pregnancy.

6- Present study is comparable to other studies and there is no big variation.

The significant of this research is to find a beneficial solution for the problem that the Saudi women face which is unknown LMP date that eventually leads to incorrect EDD by introducing a specific nomogram for Saudi women. This nomogram was done by comparing the CRL measurement with those of other published nomograms from different geographic areas. And we concluded that even in this research the CRL is proved to be a reliable measurement to estimate the GA.

Recommendations:

- 1- Using a larger sample of participant to obtain more accurate results.
- 2- Expanding the research population to larger geographic areas to benefit a majority of Saudi women.
- 3- All pregnant women should have a dating scan in the first trimester - ideally at 10 to 13 weeks of pregnancy-. This is especially important if they are going to have any screening tests for Down's syndrome.

CONCLUSION:

In the first trimester there is a very little biologic variation in fetal size compared with later trimesters. It is therefore a good time in pregnancy to determine gestational age by ultrasound where the crown-rump length [CRL] is measured and compared to published reference charts [9]. Since that accurate dating of gestational age is central to good obstetric care. And it leads to a better prediction of the fetus fate the importance of this research came. In this research we conclude that the measurement obtained from Saudi women were comparable with the previous published nomograms with minimum difference. And the CRL is proved to be a reliable measurement to estimate the GA. And they are strongly correlated.

REFERENCES:

1. The Merkmanual , 19th edition ,Chapter 18 : Gynecology and obstetrics , page 2606 , 2011
2. Farzanasaleem, Fernandez hospital,hyderabad, sonographic evaluation of fetal growth patterns and perinatal outcomes,2010
3. Jana L Allison, Rebecca S Sherwood, and Danny J Schust, ,Management of First Trimester Pregnancy Loss.
4. Smeets NA, Prudon M, Winkens B, Oei SG. Fetal volume measurements with three dimensional ultrasound in the first trimester of pregnancy, related to pregnancy outcome, a prospective cohort study,Department of

- Gynecology and Obstetrics, Atrium Medical Centre, Parkstad, Heerlen, The Netherlands.
5. Ndumbe FM, Navti O, Chilaka VN, Konje JC. Prenatal diagnosis in the first trimester of pregnancy. *Obstetrical and Gynecological Survey*. 2008;63[5]:317–328. [PubMed]
 6. Estimation of Gestational Age According to Crown-Rump Length in Nepalese Population: A Comparison with Previously Published Nomograms
 7. Joan M astrobattista, Deborah Levine, Diagnosis and outcome of first trimester growth delay
 8. <http://www.ultrasoundpaedia.com/normal-1sttrimester/>
 9. Whitworth M, Bricker L, Neilson JP, Dowswell T. Ultrasound for fetal assessment in early pregnancy. *Cochrane Database of Systematic Reviews*. 2010;4CD007058 [PubMed]
 10. .BhusariPrashant,.Chormunge Vijay, Kathe Dinesh, Khairnar Karan, Foetal Age Estimation: Using First Trimester Gestational Parameters.