ORIGINAL ARTICLE

Accuracy of Crown–Rump Length in Determination of Expected Date of Delivery in 1st Trimester of Pregnancy on Ultrasound

FAROOHI SAGHIR1, SADIA RIAZ2, KAMRAN NASEEM3

ABSTRACT

Aim: To determine the accuracy of crown–rump length in determination of expected date of delivery in 1st trimester of pregnancy on ultrasound.

Methods: This cross sectional study was conducted at Department of Radiology Bahawal Victoria Hospital, Bahawalpur from February 2015 to September 2015. Total 126 women with 1st trimester of pregnancy was included in this study.

Results: Accuracy rate of deliveries were 108(85.7%) estimated by ultrasound in first trimester. In Group A (18-30 years), there were 105 (83.33%) patients and accuracy rate was 87(82.9%) and in Group B (31-45 years) there were 21(16.17%) and accuracy rate was 100%. In first gestational age group there were 77(61.11%) patients and accuracy was 72(93.5%) and in second gestational age group there were 49(38.89%) patients and accuracy was 36(73.5%).

Conclusion: Accuracy of Ultrasound based EDD estimation is found better in first trimesters in detection of date of delivery. A higher rate of accuracy of Ultrasound based EDD estimation was noted in third decade of life as compare to second decade of life. It is also observed that accuracy was significantly associated with gestational age.

Keywords: Ultrasound, Gestational Age, Last Menstrual Period, Accuracy, estimation

INTRODUCTION

The estimated date of delivery EDD has profound social, medical and personal implications for the pregnant woman and is a vital yardstick for the clinicians who is responsible for safe delivery of their patient. In obstetric care, proper evaluation of gestational age is paramount.

To make the proper management, decisions need correct estimation of gestational age. Accurate pregnancy dating may assist obstetricians in appropriately counseling women who are at risk of a preterm delivery (Delivery of fetus before 37 weeks) about likely neonatal outcomes and is also essential in the evaluation of fetal growth and the detection of intrauterine growth restriction. Almost 70% of women in USA have ultrasound testing done in pregnancy to determine delivery date. Thats why the correct information about gestational age is essential for monitoring the growth of the fetus throughout pregnancy and to provide optimal management of the fetus in connection with date of delivery.

Knowledge about the date of delivery is anessential for taking care of fetus and for the classification of a delivery as preterm, term or post-term (After 42 weeks). Its accuracy is therefore of paramount importance. Women now have estimate which is the prediction based on the measurement by ultrasound scanning of well-recognized fetal parameters. For the pregnant woman, the deliveries have various implications on pregnancy. The Ultrasound assessment is limited because it introduces bias as it is based on fetal growth, and thus could systematically result in the assignment of incorrect lower gestational age estimates for small fetus and incidence of the infants born as preterm is 7.9%, and 1.1% as post term.

In low-resource settings such as Pakistan where limited information or education is routinely unavailable, mothers often determine gestational age of fetus by relying on USG. The estimation of the magnitude of accuracy of USG in 1st trimester of pregnancy in assessing the delivery date is very important. If its accuracy is higher, then it can be used for the assessment of date of delivery in future and to improve the quality of obstetric care to patient and newborn.

MATERIALS AND METHODS

This cross sectional study was conducted at Department of Radiology, Bahawal Victoria Hospital, Bahawalpur from February 2015 to September 2015. Total 126 primigravida with first trimester of pregnancy having age 18-45 years were selected. Women with Multiple gestation, nonviable pregnancy and fetal malformation, Women who are planned for elective cesarean or induction of labor were excluded from the study. All the selected patients were referred by the Department of Obstetrics and Gynecology.
Bahawal Victoria Hospital for ultrasound. Before commencing the study, an approval was taken from review committee of the institution and written informed consent was taken from every patient. Accuracy was labeled as positive if delivery occurs on the date estimated by USG in first trimester of pregnancy.

First trimester of pregnancy: Time period extending up to 12th weeks of gestation.

Term: Term means if the delivery occurs at or between 37 completed weeks and 41 weeks +6days.

1st trimester USG was done and the date of delivery was estimated by USG was noted on pre-designed proforma. At the time of delivery if 1st trimester USG date was match with the date of delivery, then accuracy was positive, this information was entered into the Performa. All the collected data was entered in SPSS version 18 and analyzed. Mean and SD was calculated for numerical data frequencies was calculated for categorical data.

RESULTS

Mean age of the patients was 26.48±3.84 and mean gestational age of fetus was 10.15±0.86 weeks. Ultrasonography was done in all patients for expected date of delivery in first trimester. As shown in figure 1, accuracy rate of deliveries were 108(85.7%) estimated by ultrasound in first trimester. After stratification of age, two groups were made Group A and Group B. Group A consisted on patients having age 18-30 years and Group B consisted on patients having age 31-45 years. In Group A, there were 105(83.33%) patients and accuracy rate was 87(82.9%) and in Group B there were 21(16.17%) and accuracy rate was 100%. Statistically significant (P=0.029) association of accuracy of EDD on USG with age was noted.

Table 1: Stratification of age

<table>
<thead>
<tr>
<th>Age group</th>
<th>Accuracy</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Group A</td>
<td>87(82.9%)</td>
<td>18(17.1%)</td>
</tr>
<tr>
<td>Group B</td>
<td>21(100%)</td>
<td>0</td>
</tr>
</tbody>
</table>

P value 0.029

Table 2: Stratification of gestational age (in weeks)

<table>
<thead>
<tr>
<th>Gestational age</th>
<th>Accuracy</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>9-10</td>
<td>72(93.5%)</td>
<td>5(6.5%)</td>
</tr>
<tr>
<td>11-12</td>
<td>36(73.5%)</td>
<td>13(26.5%)</td>
</tr>
</tbody>
</table>

P value 0.002

DISCUSSION

The estimation of the expected date of delivery has vital importance in pregnant patients. It gives pleasure with mental and physical preparation of the patients for the welcoming of a new life. Appropriate EDD (expected date of delivery) should be calculated in the early trimester and documented on the antenatal file in obstetric care. In present study ultrasound based accuracy rate of expected date of delivery (EDD) in 1st trimester of pregnancy was 85.7%. This value is in agreement with the study by Dietz et al they reported accuracy rate of EDD on ultrasound in trimester of pregnancy as 91%. Once first trimester USG estimation was reserved for those ladies having unknown LMP dates. But it became very popular in USA with the passage of time. But it is not beneficial in routine use in low risk populations. In USA, clinician often revise women due date when ultrasound and LMP estimation differ by 7 days or more up to 20 weeks gestation. In 20-30 weeks gestation, if the difference is 14 days and at 30 week gestation if the difference is 21 days or more.

The basis of gestational age estimation by USG, various measurement of fetus is taken by obstetrician on the basis of reported LMP date. Crown rump length is used in the estimation of gestational age with rapid growth and linear relation with the gestational age at that time. Crown rump length mark is visible at the 8th week gestation approximately. In the last two trimesters combination
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of biparietal diameter of head circumference and femur length are used after that standard formula is applied13–15. The ultrasonic accuracy of EDD estimation in first trimester in my study was found better in women of middle to late reproductive ages (31-45 years) where it was nearly 100%. Although it is not poor in early to middle ages (18-30 years) where it found to be 82.9%. As it is well known and documented in the literature EDD estimation by ultrasonically has better results in early trimester than later trimesters even found much better in early weeks than late weeks of first trimester14. In our study 9-10 weeks of gestation age have 93.5% accurate EDD than 11-12 weeks have found 73.5% accurate EDD.

Most of the early work that was conducted comparing LMP with ultrasound dating techniques used fetal head measurements (i.e., biparietal diameter) to estimate gestational age15. These studies work performed in second or third trimesters of gestation according the LMPs. There were remain limitations as some of the women were found unreliable. So the ultrasound base dating techniques were found superior to dating based on LMP. Particularly with regarding to predicting the actual date of delivery.16

Mongelli and colleagues17 concluded that among the all the estimated dates of delivery for singleton pregnancies with reliable menstrual date according to five methods: LMP only, ultrasound only, and three separate combinations of LMP and ultrasound, the EDD by ultrasound independently was found more accurate. Delivery occurred within 10 days of the estimated date in 64.1% of the women when menstrual dates alone were used, and in 70.3% of the women when ultrasonography alone was used. However, it should be stressed that delivery occurred on the predicted date in only 3.6% of women when the date was based on LMP and in only 4.3% of women when the date was based on ultrasound.

Limitations: Our study is purely hospital based and including only those patients who came for antenatal care. It does not include multiple pregnancies as well as those who went to one or more complications during their pregnancies. It is now recommended to make a community based study to generalize the results.

CONCLUSIONS

Accuracy of Ultrasound based EDD estimation is found better in first trimesters in detection of date of delivery. A higher rate of accuracy of Ultrasound based EDD estimation was noted in third decade of life as compare to second decade of life. It is also observed that accuracy was significantly associated with gestational age.