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Research Article

Determination of accuracy of ultrasonography in 1st trimester of pregnancy in detection of date of delivery

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ABSTRACT

Objective: To determine the accuracy of Ultrasonography in 1st trimester of pregnancy in detection of date of delivery.

Study design: Cross sectional study

Settings: Department of Obstetrics and Gynecology,Govt. Kot Khawaja Saeed Hospital Lahore

Duration of study: From March 2017 to September 2017.

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: Ultrasound based EDD estimation is found better in first trimesters in detection of date of delivery.

Key words: Ultrasound, Gestational Age, Last Menstrual Period, Accuracy, estimation.Expected Date of Delivery

INTRODUCTION

The estimated date of delivery has profound medical, social and personal implications for the pregnant woman and is a vital yardstick for the doctor who is responsible for the safe delivery of her patient. Appropriate assessment of gestational age is paramount in obstetric care[1]. Making appropriate management decisions requires accurate appraisal 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[1, 2]. Approximately 70% of women in the United States ofAmerica have ultrasound testing done in pregnancy to determine the date of delivery[3].Thats why the precise information about the gestational age is necessary for monitoring the development of the fetus throughout pregnancy and to provide optimal management of fetus in connection with date of delivery.[4]

Knowledge of the delivery date is a prerequisite for taking care of the fetus and for classification of a delivery as preterm, term or post-term (After 42 weeks).Its accuracy is therefore of paramount importance.[5]Women now have estimate which is the prediction based on the measurement by ultrasound scanning of well-recognized fetal parameters.[6] 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[2].

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 obstetri1cal care to patient and newborn.

OPERATIONAL DEFINITIONS:

1. **Accuracy**: was labeled as positive if delivery occurs on the date estimated by USG in 1st trimester of pregnancy.
2. **First trimester of pregnancy:** Time period extending up to12th weeks of gestation.
3. **Term:**Term means if the delivery occurs at or between 37 completed weeks and 41 weeks +6days.6, 7.

MATERIALS AND METHODS:

Study design: Cross sectional study

Setting: Department of Obstetrics and Gynecology, Govt. Kot Khawaja Saeed Hospital Lahore

Duration: From March 2017 to September 2017.

Inclusion criteria:

1. Singleton pregnancies
2. 18 to 45 years of age
3. Primigravida

Exclusion criteria:

1. Crown-rump length less than 15 mm (less than 8 weeks) ,
2. Multiple gestation
3. Nonviable pregnancy and fetal malformation.
4. Women who are planned for elective cesarean or induction of labor were excluded.

Data collection procedure:

Patients who are fulfilling the inclusion criteria visiting the Department of Obstetrics and Gynecology, Govt. Kot Khawaja Saeed Hospital Lahore. Patients was explained the study procedure and its purpose in brief and the informed consent was taken & the permission from the ethical committee was sought. As a protocol 1st trimester USG was done & the date of delivery was estimated by USG of sonologist having 3-5 years' experience. 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. The First part of the Performa was completed at the time of registration (Annexure-1) while the part second was completed at 37 to 41 weeks+6days or at time of delivery.

Data analysis procedure:

Data was entered and analyzed into computer software SPSS version 10.Frequncies and percentages was used for age of the woman and gestational date (Quantitative variables) estimated by USG. Chi square test was applied. The allocation of groups is based on random technique, so to minimize the effects of confounder (effect modifier), stratification of variable like age was performed. The level of significance ≤ 0.05 was significant.

RESULTS

All the data were entered in SPSS V.17 and analyzed. Results are as follows.

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%. Table No.1

Stratification was also done for gestational age and two groups was made, patients in first group

having gestational age 9-10 weeks and patients in second group having 11-12 weeks gestational age. 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%). Table No.2

Figure 1: Accuracy of ultrasonography in 1st trimester

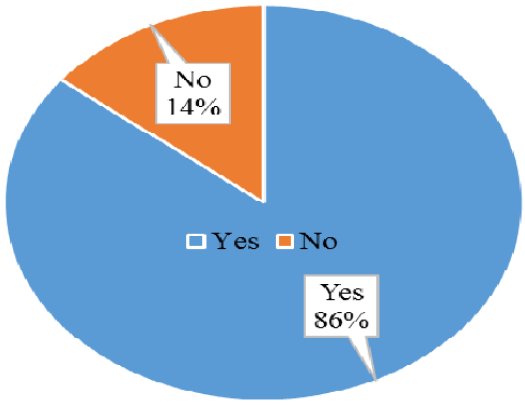

Table No.1: Stratification of age

Age Groups	Accuracy		Total	P. value
	Yes	No		
18-30 Group A	87 (82.9%)	18 (17.1%)	105 (83.33%)	0.029
31-45 Group B	21 (100%)	0	21 (16.17%)	
Total	108 (85.7%)	18 (14.3%)	126	

Table No.2: Stratification of gestational age (in weeks)

Gestational Age	Accuracy		Total	P. value
	Yes	No		
9-10	72 (93.5%)	5 (6.5%)	77 (61.11%)	0.002
11-12	36 (73.5%)	13 (26.5%)	49 (38.89%)	
Total	108 (85.7%)	18 (14.3%)	126	

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 this study ultrasound based accuracy rate of EDD in first trimester was 85.7% which is compare able with 91% accuracy rate at one study by Dietz PM et al.[2] The ultrasound based gestational age dating in first-trimester ultrasound was once reserved for women with unknown LMP dates, it is becoming increasingly common in the US to use ultrasound to routinely verify women's estimated dates of delivery. Many women in the US have at least one obstetric ultrasound during pregnancy.[8] However research has failed to demonstrate the benefit of its routine use in low-risk populations.[9-10] US clinicians will often revise a woman's due date if the LMP and

ultrasound-based estimates differ by more than 7 days up to 20 weeks' gestation, 14 days from 20 to 30 weeks' gestation, and 21 days at 30 weeks' gestation and beyond.[11]

The basis of gestational age estimation by ultrasonography, clinicians take various measurements of the fetus depending on the woman's reported LMP date.[12] For ultrasounds performed during the first trimester, crown–rump length is used to estimate gestational age, given its rapid growth and linear relation with gestation age during this time period.[13] The crown–rump landmarks become visible at approximately 8 weeks' gestation.[8] In the second and third trimesters, various combinations of biparietal diameter, head circumference, abdominal circumference and femur (diaphysis) length are used.[14] The fetal measurements are compared with age-specific references using standard formulae.

When considering the use of menstrual histories vs ultrasound for pregnancy dating, it is important to understand that the techniques measure two different entities. One measures the length of pregnancy, and the other measures the size of the fetus. Numerous studies have compared the use of menstrual vs ultrasound-based dating for gestational age assessment, and most have reported that dating based on early second-trimester ultrasound is superior to LMP based dating in predicting the actual date of delivery, even among women with certain LMP dates.[8,15-16]

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 trimester. 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 age.[17] 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.[18]

Mongelli and colleagues[19] concluded that among the all the estimated dates of delivery for singleton pregnencies 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 included 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.

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