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Role of routine ultrasound in first trimester of pregnancy

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Abstract
Introduction: Ultrasound is a specific method of examination in early stages of pregnancy, with a specificity of 97.6%[1]. It usually determines the location and viability of a pregnancy and gestational age by 5 weeks of pregnancy[2]. In addition to these other conditions like uterine anomalies, adnexal diseases, and cervical length can all be diagnosed in the first trimester.[3] First trimester ultrasound can predict the chorionicity, type of twinning in multiple gestations, which allows for appropriate counselling and management[4].
Aims and Objectives: To emphasize the importance of routine ultrasound in first trimester of pregnancy in detecting and dating gestation, its viability and early detection of anomalies. And to diagnose an early pregnancy failure and multiple gestation.
Materials and Methods: This is a prospective observational study conducted at KIMS, Narketpally involving 30 pregnant women within 12 weeks of gestation attending antenatal OPD.
Results and Conclusion: In this study of 30 pregnant women all are intrauterine pregnancies, of which 2 had early pregnancy failure, 2 of them showed sub chorionic collection, 1 had bicornuate uterus (Mullerian anomaly), 3 of them with no cardiac activity requiring follow up scan, 1 showed intrauterine pregnancy with associated hemorrhagic ovarian cyst and 1 intrauterine pregnancy with associated fibroid were identified. Hence the study showed the routine ultrasound in first trimester was helpful to detect and date pregnancy, identify nonviable Pregnancies, cervical length in diagnosing cervical incompetence and hence has significant role in Evaluation of first trimester of pregnancy.

Keywords: Ultrasound, first trimester, viability, multiple gestation, chorionicity, uterine anomalies

Introduction

Ultrasound is a specific method of examination in early stages of pregnancy, with a specificity of 97.6% [1]. It usually determines the location and viability of a pregnancy and gestational age by 5 weeks of pregnancy [2]. In addition to these other conditions like uterine anomalies, (like location and size of fibroids/masses), adnexal diseases, and cervical length can all be diagnosed in the first trimester [3]. First trimester ultrasound can predict the chorionicity, type of twinning in multiple gestations, which allows for appropriate counselling and management [4]. By fifth week of gestation, products of conception forms a gestational sac that usually measures 5 mm in diameter [4]. While a yolk sac may be identified at this stage, the embryo remains below the level of detection using current ultrasound technology [4]. Usually Embryonic Period starts at sixth week and at this period embryo becomes visible sonographically for the first time and organ systems develop and cardiac activity becomes visible sonographically by the beginning of sixth week and this embryonic period completes at the end of tenth week and at this point of time the crown rump length (CRL) which is measured from the developing embryo measures approximately 30 mm [4]. First trimester ultrasound includes evaluation of uterus and adnexa, and look for presence of G-sac, yolk sac and embryo. And the gestational age can be calculated by length of embryo but if embryo is not visualised then the mean sac diameter can be used to measure gestational age [5].

Aims and Objectives

To emphasize the importance of routine ultrasound in first trimester of pregnancy in detecting and dating gestation, its viability and early detection of anomalies. And to diagnose an early pregnancy failure and multiple gestation.

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Inclusion criteria
Pregnant women with history of amenorrhea with known last menstrual period (LMP) within 12 weeks gestational age.

Exclusion criteria
Individuals with history of pain abdomen and bleeding per vaginum.
Patients not willing to participate in study (non-consenting patients).

Materials and Methodology
The present study was a prospective observational study conducted at the Kamineni Institute of Medical Sciences, Narketpally on 30 Pregnant women with history of amenorrhea with known last menstrual period (LMP) within 12 weeks gestational age. Individuals with history of pain abdomen and bleeding per vaginum. Patients not willing to participate in study were excluded from the study. After taking informed consent, detailed history, thorough clinical examination was made and all the women were subjected to transabdominal sonography (TAS). The parameters measured and studied are gestational sac number and location, presence or absence of fetal pole, cardiac activity absent or present, crown-rump length (CRL) measurements, any uterine anomalies and tumors, presence of corpus luteal cysts, pelvic or adnexal mass, cervical length. Depending on the gestational age, findings varies from patient to patient and all the measurements were recorded.

Results
On studying 30 pregnant woman the results were as follows.

Table 1: Distribution of cases according to age

S. No	Age	Total (n = 30)
1.	≤ 20	2(6.66%)
2.	21 - 25	22(73.3%)
3.	26 - 30	4(13.3%)
4.	31 - 35	2(6.66%)

Of the study group 6% were ≤ 20 years, 74% were aged between 21- 25 years, 13.3% between 26 - 30 years and the remaining 6% were between 31-35 years.

Table 2: Distribution of cases according to parity

S. No	Gravida	Total (n=30)
1.	Primigravida	13(43.3%)
2.	Multigravida	17(56.6%)

Of all the pregnancies 43.3% were primigravida and 56.6% were multigravida.

Table 3: Distribution of cases according to gestational age by last menstrual period and ultrasonography.

S. No	Gestational Age	Distribution by LMP(n=30)	Distribution by USG (n=30)
1.	5 - 5^{+6} weeks	0(0%)	2(6.66%)
2.	6 - 6^{+6} weeks	0(0%)	2(6.66%)
3.	7 – 7^{+6} weeks	5(16.6%)	5(16.6%)
4.	8 - 8^{+6} weeks	7(23.3%)	8(26.6%)
5.	9 - 9^{+6} weeks	5(16.6%)	5(16.6%)
6.	10 - 10^{+6} weeks	7(23.3%)	5(16.6%)
7.	11 - 11^{+6} weeks	6(20%)	3(10%)
8.	12 weeks	0(0%)	0 (0%)

Of the study group most of the individuals (23.3%) initial visit of gestational age according to Last menstrual period was between 8-8 weeks 6 days followed by between 10-10 weeks 6 days. And most of the individuals (26.6%) initial visit of gestational age according to Ultrasonography was between 8-8 weeks 6 days.

Table 4: Distribution of cases according to status of fetal pole

S. No	Fetal pole status	Total (n=30)
1.	Present	27(90%)
2.	Absent	3(10%)

In the present study Fetal pole was present in 90% cases and absent in 10% of cases.

Table 5: Distribution of cases according to gestational age by USG and CRL

S. No	Gestational Age By USG	Total No Cases (N=30)	Mean of CRL	Standard Deviation
1.	5 - 5^{+6} weeks	2	-	-
2.	6 – 6^{+6} weeks	2	-	-
3.	7 – 7^{+6} weeks	5	13.4 mm	4.59
4.	8 - 8^{+6} weeks	8	18.7 mm	1.19
5.	9 - 9^{+6} weeks	5	26.5 mm	1.58
6.	10 - 10^{+6} weeks	5	35.7 mm	1.94
7.	11 - 11^{+6} weeks	3	45.03 mm	5.02
8.	12 weeks	0	0	0
			Total mean-25.6	Total SD-11.01

The CRL of the cases that were between 5-5weeks 6 days and 6-6weeks 6 days gestational age were couldn't be measured as Embryo was not formed at that particular gestational age. The total of mean of CRL and standard deviation gives the average CRL of the study group which was 25.6 ±11.01 mm.

Table 6: Distribution of cases according to gestational age by USG and cervical length.

S. No	Gestational Age by USG In Weeks	Total No Cases (N=30)	Mean of Cervical Length	Standard Deviation
1.	5 - 5^{+6} weeks	2	3.45 cm	0.05
2.	6 - 6^{+6} weeks	2	3.8 cm	0.1
3.	7 – 7^{+6} weeks	5	3 cm	0.46
4.	8 - 8^{+6} weeks	8	3.2 cm	0.61
5.	9 - 9^{+6} weeks	5	3.28 cm	0.64
6.	10 - 10^{+6} weeks	5	3.32 cm	0.21
7.	11 - 11^{+6} weeks	3	3.26 cm	0.16
8.	12 weeks	0	0cm	0
			Total mean3.29cm	Total SD-0.49

The mean cervical length in the present study was found to be 3.29 cm with a standard deviation of 0.49 cm.

Table 7: Distribution of cases according to USG findings

S. No	Ultrasonography Findings	Total no of cases (n=30)
1.	Early Pregnancy Failure	2 (6.66%)
2.	Subchorionic Collection	1 (3.33%)
3.	Myometrial Fibroid	1 (3.33%)
4.	Bicornuate Uterus	1 (3.33%)
5.	Normal	21 (70%)
6.	Hemorrhagic Cyst	1 (3.33%)
7.	Follow up Scan For Viability	3 (10%)

The ultrasonography findings were normal in 21cases (70%) and

2 cases (6.66%) showed early pregnancy failure,1 case (3.33%) with normal pregnancy with incidental finding of myometrial fibroid. 1 case (3.33%) had bicornuate uterus,1 case (3.33%) with incidental finding of hemorrhagic cyst,1case (3.33%) with subchorionic collection and 3 cases (10%) required follow up scan for viability.

Discussion
In the present study, majority of the individuals 74% were between 21-25 years age group, whereas in Saravanan and kirubamani study [6] majority of the individuals 38% were between 25-29 years age group. In this study 56.6% were multigravida, which is comparable with Saravanan and kirubamani study where 61% of the study group were multigravida.70% cases showed features of normal intrauterine pregnancy and 2 cases (6.66%) showed early pregnancy failure and is comparable with Saravanan and kirubamani study [6] where 80% of pregnancies belonged to normal category and 2 cases (2%) with embryonic demise. In this study crown rump length was studied for 25 cases as the other cases includes early pregnancy failure and some required follow up scan, and the CRL measurements were corresponding to respective gestational age making it an accurate parameter to determine the gestational age of the fetus in the first trimester. It is recommended that CRL is the two most commonly measured parameter for pregnancy dating in first trimester as the biometry normograms studied by Robinson & Fleming et al., [7] Loughna et al., [8] Hadlock et al., [9] Verburg et al. [10] The total of mean of CRL and standard deviation gives the average CRL of the study group which is 25.6±11.01 mm and using one way analysis of variance (ANOVA) statistical test, it was found that the correlation between gestational age and CRL was significant with a p value of <0.001, and is comparable with Saravanan and kirubamani study [6]. The mean cervical length in the present study was found to be 3.29cm with a standard deviation of 0.49cm which falls within the normal range for women in the first trimester of pregnancy and is comparable with Saravanan and kirubamani study [6] where the mean cervical length was found to be 3.49 cm with SD of 0.35 cm.

Summary
This study involved 30 pregnant women in the first trimester of which 74% were aged between 21 and 25 years i.e majority of the individuals were between 21-25 years age group.
Of all the pregnancies 43.3% were primigravida and 56.6% were multigravida. Majority of the women in this study i.e 23% were screened between 8 to 8 weeks 6 days and 10 to 10 weeks 6 days. Fetal pole was present in 90% cases and absent in 10% of cases. In this study the crown rump length were available for 25 cases as the other 5 cases includes early pregnancy failure and some required follow up scan. The total of mean of CRL and standard deviation gives the average CRL of the study group which is 25.6±11.01 mm. The mean cervical length in the present study was found to be 3.29 cm with a standard deviation of 0.49cm which falls within the normal range for women in the first trimester of pregnancy. The ultrasonography findings were normal in 21cases and 2 cases showed early pregnancy failure,1 with normal pregnancy with incidental finding of myometrial fibroid.1 of the cases had bicornuate uterus,1 with incidental finding of hemorrhagic cyst with normal intrauterine pregnancy,1 with subchorionic collection and 3 required follow up scan for viability.

Conclusion
Routine ultrasound examination is an established part of antenatal care if resources are available and access possible and is a noninvasive, nonradioactive, effective method for dating pregnancy, for identifying nonviable pregnancies, fetal abnormalities and uterine anomalies and thus making it probably a reliable investigative tool in first trimester of pregnancy.

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