

# Role of Routine Ultrasound in First Trimester of Pregnancy: A Descriptive Study

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## Abstract

**Introduction:** First trimester of pregnancy is a period of rapid development where embryo attains a human form and ultrasound is a very sensitive method of evaluating early pregnancy. Routine ultrasound between 8 and 12 weeks of gestation helps in identification of many physiological and pathological problems and the timely interventions and management. In spite of this, even today in developing/industrialized countries, this is not being routinely done.

**Aim:** To emphasize the need for routine ultrasound in first trimester of pregnancy for detection of early gestation, its viability and also early detection of complications by sonoembryology.

**Methods:** This study is a descriptive study involving 100 low-risk pregnant women between 8 to 12 weeks of gestation with known last menstrual period conducted at Subharti medical college meerut. All the patients were subjected to transabdominal sonography (TAS) and followed by transvaginal sonography (TVS) and were followed till delivery with subsequent scan when necessary.

**Results:** A total of 100 pregnancies were intrauterine of which 3 were an embryonic and 4 had early pregnancy failure, 13 pregnancies were redated, one subchorionic leave separation, 3 physiological herniation of bowel loops, and 1 physiological herniation with single cord cyst were identified only by TVS and had favorable outcome. Two twin pregnancies were identified and managed.

**Conclusions:** The study showed the routine ultrasound in first trimester in low-risk women was helpful in timely identification of complications and redating of the pregnancies, thereby reducing the induction rates. This study also gives insight that TVS is superior to TAS in evaluation of fetal structure.

**Key words:** Ultrasound, First Trimester, Pregnancy

## INTRODUCTION

Ultrasound is a very sensitive method of evaluation in early pregnancy. The advent of ultrasound has made an indisputable impact on assessment of clinical condition in the first trimester.<sup>1</sup>

The first trimester of pregnancy is a period of rapid change that spans fertilization of formation of the blastocyst, implantation, gastrulation, neurulation, the embryonic

period (6-10 weeks), and early fetal life.<sup>2</sup> By 5 weeks of gestation, ultrasound can usually identify the location and viability of pregnancy as well as gestational age.<sup>3</sup> Apart from pregnancy, uterine anomalies, adnexal pathologies, and cervical length can be detected accurately in the first trimester of pregnancy. Furthermore, all the first trimester complications can be identified earlier even before they manifest clinically. Antenatal detection of fetal malformations has shown to reduce maternal and perinatal morbidity and mortality by allowing elective termination of malformed fetus.<sup>4</sup>

Prenatal screening of down's syndrome<sup>5</sup> and other aneuploidies<sup>6</sup> using ultrasound measurement of fetal nuchal translucency (NT) in combination with other sonographic soft markers and serum markers are found to be very sensitive, hence offers better antenatal care.

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**Aims and Objectives**

To emphasize the need for routine ultrasound in first trimester of pregnancy for detection of early gestation, its viability, and also early detection of complications by sonoembryology.

**MATERIALS AND METHODS**

This descriptive study involved low-risk 100 pregnant women between 8 and 12 weeks of gestation with reliable last menstrual period (LMP) details and attending antenatal clinic at Subharti medical college meerut, during the period of 2 years from December 2007 to December 2009. Purposive sampling was done.

**Inclusion Criteria**

Pregnant women with history of amenorrhea >8 weeks and <12 weeks of gestation.

**Exclusion Criteria**

- Individuals with history of pain abdomen and bleeding per vaginam.
- Individuals with history of previous abortions.
- Elderly primigravida.
- Uterine anomalies.

After informed written consent, detailed history, thorough clinical examination was made at booking. All routine first trimester investigations were carried out according to the hospital protocols. All patients were subjected to transabdominal sonography (TAS) and transvaginal sonography (TVS) after explaining the procedure to the patient. All cases were followed up till the delivery with subsequent scan done when necessary. Our institution is registered under PNDT act and has followed the rules and regulations according to the act.

Study parameter considered are gestational sac shape, number and location, yolk sac size and shape, presence or absence of fetal pole, cardiac pulsation absent or present, crown-rump length (CRL) measurements, uterine anomalies and tumors, presence of corpus luteum, pelvic or adnexal mass, cervical length, study of nuchal translucency (NT) and nasal bone.

**Statistical Methods**

Descriptive statistical analysis with categorical measurements is presented in numbers (%) or mean±standard deviation. Chi-square/fisher exact test was used to find the significance of study parameters.

Analysis of variance formula and statistical software SPSS 15.0, Stat 8.0 were used for the analysis for the data.

**RESULTS**

Descriptive study involved in 100 pregnant women between 8 and 12 weeks of gestation with 57% of the women aged between 20 and 24 years and 37% between 25 and 29 years and 62% were primigravida and 38% were multigravida. All patients belong to low risk at the time of booking.

**DISCUSSION**

The antenatal care is the preventive and prophylactic arm of obstetric practice and ultrasound is an integral part of this antenatal care.

Ultrasound when employed in first trimester can accurately date the pregnancy and by this induction rates can be reduced by 40%.<sup>7</sup>

In this descriptive study, 100 pregnant women between 8 and 12 weeks of gestation were involved. The majority of the women were between 20 and 24 years and 62% of them were primigravidae with known LMPs. None of the 100 women had any first trimester complaints, previous history of recurrent abortions, uterine anomalies or medical disorders. They belonged to a low-risk population and majorities were screened between 9 and 9.9 weeks (Table 1). All the 100 women underwent transabdominal scan followed by transvaginal scan.

Out of the 100 pregnant women scanned, anembryonic pregnancy found to be 3%, which correlates with many other studies (Table 2).<sup>8-11</sup>

The difference between gestation age by dates and by scan was found to be >5 days in 13 women, i.e., 13.4%. The number of pregnancies redated was 13.4% and a significant reduction in induction rate was 46%. Wide variation is noted in different studies in date reassignment, which

**Table 1: Gestational age distribution**

Gestational age by dates (in weeks)	Number n=100 (%)
8-8.9	24 (24)
9-9.9	32 (32)
10-10.9	9 (9)
11-11.9	18 (18)
12	17 (17)

**Table 2: Fetal pole**

Fetal pole	Number n=100 (%)
Absent	3 (3)
Present	97 (97)

varies from 5.7% to 40%.<sup>12,13</sup> Three were anembryonic pregnancies, hence CRL was not done and fetal heart rate (FHR) was identified in 93 patients with 4 cases showing early fetal demise (Table 3).

Gestational sac was found to be normal with respect to its location and shape suggesting intrauterine pregnancies in all the cases. The mean yolk sac values increased as the gestational age increased (Table 4). Yolk sac shape and echolucency was found to be normal in all the cases.

Cervical length measurement was done for all the patients and found that no statistical difference in the measurement by TAS and TVS with  $P > 0.05$  and mean cervical length being 36.40 mm (TAS) and 37.71 mm (TVS), respectively.

Two twin pregnancies were diagnosed, but TAS could identify only 1 among the 2. Physiological herniation of bowel loops was observed in 4 pregnancies all only by TVS suggesting statistical significance with p value of 0.043 compared to TAS (Table 5).

Of the 100 pregnancies, 22 of them were abnormal, i.e., blighted ovum constituted 3%, early embryonic demise 4%, subchorionic leave separation 1%, wrong dates 13% and physiological herniation of bowel loop with a single umbilical cyst was 1%. 7 pregnancies were

electively terminated and the rest had favorable outcome (Table 6).

In 58 pregnant women, NT was not measured as the period of gestation was  $<11$  weeks, but were followed up subsequently. Rest of them was measured and was found to be below the 95<sup>th</sup> percentile with respect to CRL values (Table 7).

Of the 100 pregnancies, 22 were found to be abnormal at the end of the first trimester scan.

Ultrasound is a reliable method to identify nonviable pregnancies before the clinical manifestation, hence enables planned termination avoiding emergency surgery and physical trauma of unexpected vaginal bleeding.

Ultrasound also accurately dates the pregnancy, reducing the induction rate, and identifies the multiple pregnancies and chorionicity accurately.

Accurate NT measurement is a reliable method of screening for fetal abnormalities; also some structural abnormalities can be identified earlier with visualization of the uterus and adnexal structures and cervical length.

**Summary**

This is a descriptive study of 100 pregnant women between 8 and 12 weeks of gestation attending ANC at Subharti Medical College, Meerut and study conducted between December 2007 and December 2009. All patients after meeting the inclusion criteria were subjected to TAS and TVS and were followed till delivery. Different statistical analysis was applied using descriptive statistics.

Majority in this study were screened between 9 and 9.9 weeks of gestation and all were intrauterine pregnancies. 3% of pregnancies were anembryonic, 4% showed early fetal demise, 13.42% were redated and followed up. Overall 8 complications were identified, majority were by TVS. There was correlation between TAS and TVS with respect to cervical length, yolk sac measurement.

Thus routine ultrasound in first trimester was a reliable method to date pregnancy, identify nonviable pregnancies and early trimester complications. It is also a noninvasive method of identifying fetal abnormalities at the earliest, thereby enabling early termination of pregnancy. Hence, it should be offered to all patients.

**Table 3: Gestational age and CRL**

Gestational age by scan (in weeks)	Number (n=97)	Mean±SD
6-6.9	2	13.85±0.21
7-7.9	2	15.20±1.70
8-8.9	30	20.41±4.07
9-9.9	23	27.69±2.81
10-10.9	6	35.28±2.7
11-11.9	12	47.05±8.86
12-12.9	18	55.64±2.67
13-13.9	2	66±0
14-14.9	2	86.2±0
Total	97	34.27±15.94

CRL: Crown rump length, SD: Standard deviation

**Table 4: Yolk sac measurements**

Method of scan	Mean yolk sac measurement (mm)	Mean±SD	t	P
Transabdominal	3.46	1.02±0.016	0.11	0.915
Transvaginal	3.48	1.00±0.016		

SD: Standard deviation

**Table 5: Findings of transabdominal scan and transvaginal scan**

Method of scan	Number	Gestational sac		Physiological herniation of bowel loops (%)	Complications (%)
		Single (%)	Double (%)		
Transabdominal	100	99 (99)	1 (1)	0	7 (7)
Transvaginal	100	98 (98)	2 (2)	4 (4)	8 (8)

**Table 6: Findings of scan**

Findings of scan	Number n=100 (%)
Normal	78 (78)
Abnormal	22 (22)
Herniation of bowel loops with single cord cyst	1 (1)
Blighted ovum	3 (3)
Embryonic demise	4 (4)
Wrong dates	13 (13)
Subchorionic leave separation	1 (1)

**Table 7: Nuchal translucency**

Nuchal translucency (mm)	Number n=93 (%)
Not measured	58 (62.36)
0.1-1.0	18 (19.35)
1.1-2.0	17 (18.27)

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