Section: Miscellaneous

Original Research Article

# ULTRA SONOGRAPHIC STUDY IN FIRST TRIMESTER PREGNANCY

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## Abstract

**Background:** Ultrasound is the imaging study for detection and full characterization of early pregnancies, based on its accuracy, low cost, safety profile, and abundant availability. **Materials and Methods:** Out of 2560 pregnant women, 760 women within 12 weeks of gestation were studied. Patients were subjected to TAS or TVS as per the need; gestational age, nuchal translucency, and scan findings were noted. A comparison of gestation age with CRL and diameter of the yolk sac was carried out. **Result:** Gestation age in weeks, 70 (9.2%) Nuchal translucency ranged from 0.1 to 1.0 mm. In 12.6 (16.5%) had 1.1 to 2.0. USG findings were 606 (79.7%) were normal pregnancies, 8 (1.05%) were brightened ovum, 16 (2.1%) had embryonic demise, 114 (15%) had wrong dates, 8 (1%) had uterine (fibroid) mass, and 8 (1%) had ectopic pregnancies. In a comparative study of gestational age (GA) and mean value of CRL. The total mean was 36.45 (± 15.70). In comparison of Yolk sac diameter and GA, the mean value was 3.30 (± 1.35). **Conclusion:** The USG study has revealed routine findings of first trimester pregnancies fetal anomalies, GA, CRL, and diameter of yolk sac. It will help the clinician to treat such patients efficiently to avoid morbidity and mortality in later pregnancies.

## INTRODUCTION

Ultrasonography was invented by Ian Donald in 1958 and started in India around the early 1980s as a method of detecting fetal anomalies. Now this technique is regarded as a milestone of modern medicine to diagnose diseases of abdominal and pelvic viscera.[1] Ultrasound (US) is the imaging study of choice for detection and full characterization of early pregnancies based on its accuracy, low cost, safety profile, and abundant availability.[2]

In the first trimester, the USG study revealed the prediction of intrauterine growth retardation (IUGR), measurement of gestational sac, gestational age (GA), and evaluation of miscarriage.[3] Increased thickness at the first trimester is a sonographic sign of homozygous α2 thalassemia, but its sensitivity is 72%.[4] Hence, an attempt was made to evaluate the clinical outcomes in routine USG studies in first-trimester pregnancies because it is common practice for pregnancies to be predicatively categorized as low or high risk for neonates or maternal outcomes.

`In the first trimester, yolk sac (YS) is the primary source of exchange between mother and foetus before placental circulation is established. It has hematopoietic, metabolic, secretory, excretory and immunogenic functions The primary yolk sac forms at approximately 24 days of gestational age (calculated from the first day of the last menstrual period). As the extra embryonic coelom forms, the primary yolk sac is pinched off and the secondary yolk sac (termed only as the yolk sac) is formed at 27–28 days of gestational age, which is the first embryonic structure visualized in gestational sac sonographically.

In normal pregnancies, yolk sac is identified when the mean gestational sac diameter (MGSD) is 5 mm at TVS. It should be clearly observed when the gestational sac measures more than 8 mm. TVS can detect the yolk sac as early as the 5$^{th}$ week of pregnancy.

Normally, yolk sac appears as a round structure with an anechoic center surrounded by a uniformly thick and well-defined echogenic wall. Usually, the inner diameter of the yolk sac measures 3–5 mm. Its size increases progressively from the 5th gestational week to the end of the 10th gestational week; subsequently it decreases in size gradually.

Many studies on the prognostic significance of the Yolk sac for the pregnancy outcome have been performed with conventional sonography and more recently with TVS. The results are conflicting. The yolk sac size and shape have been suggested as sensitive predictors of pregnancy outcome. Thus, further studies on the measurement of yolk sac size, shape and its association with normal and abnormal


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pregnancy outcome, could help as an early predictor of pregnancy outcome.

## MATERIALS AND METHODS

Out of 2560 pregnant women, 760 women within 12 weeks of gestation regularly visited Ankura Hospital in Madinaguda, Hyderabad, Telangana-500049 were studied.

**Inclusion Criteria**

Pregnant women with history of amenorrhea <12 weeks of gestation. The patients who gave their consent in writing for study were selected.

**Exclusion Criteria**

Patients with history of pain abdomen and bleeding per vaginum, hypertension, type II DM, history of cardiac disease were excluded from the study.

**Method:** A history and clinical examination of every patient were carried out. Every routine investigation was done. After describing the technique to the patients. Every patient was subjected to transabdominal sonography (TAS) or transvaginal sonography (TVS), depending upon the patient's condition.

The parameters of the study were gestation sac location, presence of yolk sac, and absence of fetal pole. Fetal heart rate, crown-rump length (CRL) measurements, uterine anomalies and tumors, pelvic or adnexal mass, cervical length, internal OS condition, and study of nuchal translucency (NT) were studied.

The duration of the study was January 2022 to August 2024.

**Statistical analysis:** gestation age by weeks, nuchal translucency, scan findings, comparison of gestational age with CRL, diameter of yolk sac was carried out. The findings were classified with The statistical analysis was carried out in SPSS software; mean values of findings were also studied. The statistical analysis was carried out in SPSS software.


**Image 1**


**Image 2**

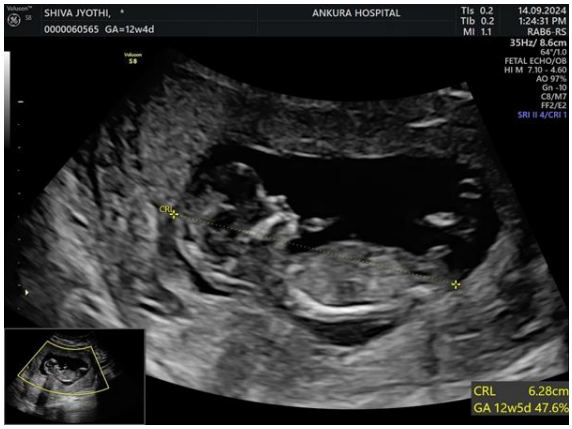


**Image 3**


**Image 4**

## RESULTS

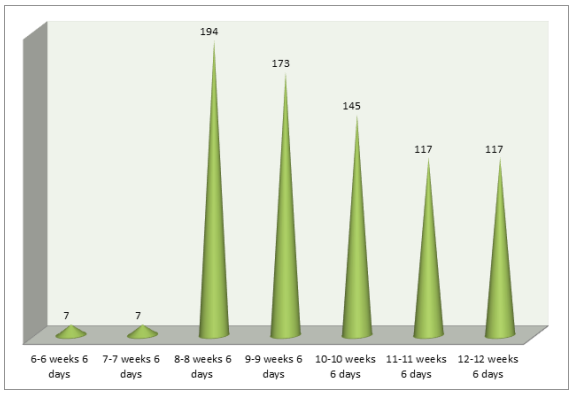


**Figure 1: Distribution of women by gestational age by Last Menstrual period (LMP)**


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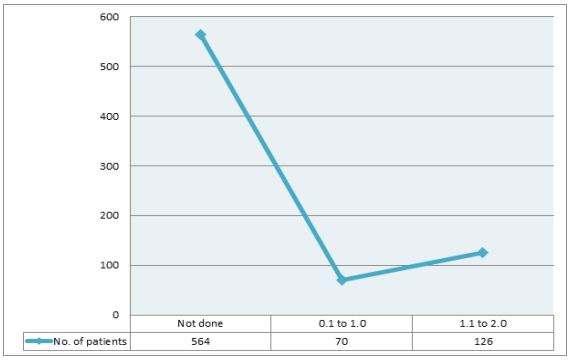


**Figure 2: Study of Nuchal translucency findings**

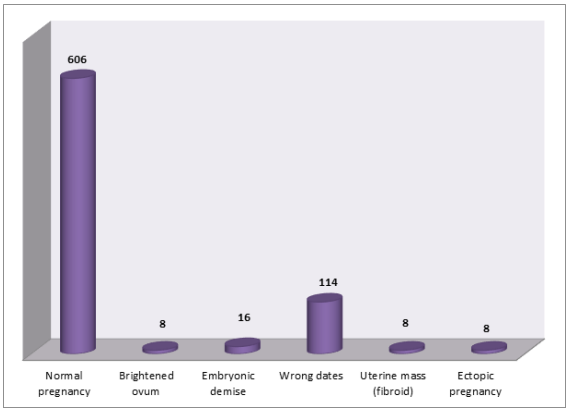


**Figure 3: Findings of ultra sonography**

[Table 1] Distribution of women by gestational age by last menstrual period (LMP) 7 women had 6-6 weeks of 6 days, 7 women had 7-7 weeks of 6 days, 194 women had 8-8 weeks of 6 days, 173 women had 9-9 weeks of 6 days, 145 women had 10-10 weeks of 6 days, 117 women had 11-11 weeks of 6 days, and 117 women had 12-12 weeks of days.

[Table 2] Study of Nuchal Translucency Findings 564 (74.2%) cases not done, 70 (9.2%) had 0.1 to 1.0 mm, 126 (16.5%) had 1.1 to 2.0 mm.

[Table 3] scan findings of UGS: 606 (79.7%) were normal, 8 (1.05%) had brightened ovum, 16 (2.10%) had embryonic demise, 114 (15%) had wrong dates, and 8 (1.05%) had uterine mass (fibroid). 8 (1.05%) had ectopic pregnancy.

[Table 4] Comparison of gestational age and CR length by USG 7 patients of 6-6 weeks of 6 days had 13.48(± 0) CRL, 7 patients of 7-7 week had 14.09 (± 0), 194 8-8 weeks 6 days had 19.30 (± 2.62) 173, 9-9 weeks of 6 days had 29.20 (± 3.96) 145, 10-10 weeks 6 days had 41.05 (± 3.36) CRL 117, 11-11 weeks of 6 days had 56.40 (± 6.58) CRL 117, 12-12 weeks 6 days had 65.05 (± 4.80) CRL.

[Table 5] Comparative study of mean yolk sac with gestational age—7 patients of 6–6 weeks 6 days had 2.10(± 0) yolk sac diameters 7, 7-7 weeks 6 days had 2.35 (± 0) diameter of yolk sac 194 patients, 8-8 weeks 6 days had 3.45 (± 1.96 diameter of yolk sac, 173 patients, 9-9 weeks) 6 days had 4.20 (± 2.15) 145 patients, 10-10 weeks 6 days had 4.66 (± 1.55) diameter 117, 11-11 weeks 6 days had 3.42 (± 1.98) 117 patients, 12-12 weeks 6 days had 2.95 (± 1.76) diameter 8 yolk sac.

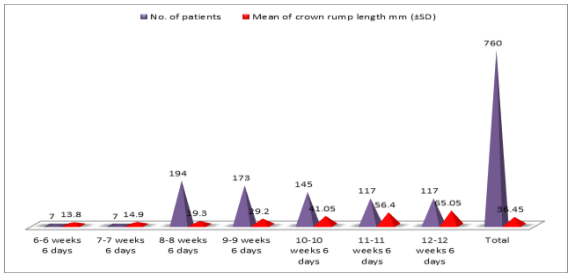


**Figure 4: Comparative of Gestational age and CRL by USG**

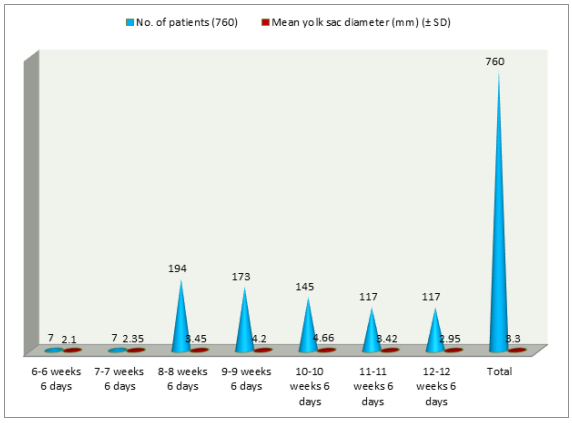


**Figure 5: Comparative of Mean Yolk sac diameter according to gestational age**

**Table 1: Distribution of women by gestational age by Last Menstrual period (LMP).**

| Gestational age by dates (weeks) | Number (760) |
|---|---|
| 6-6 weeks 6 days | 7 |
| 7-7 weeks 6 days | 7 |
| 8-8 weeks 6 days | 194 |
| 9-9 weeks 6 days | 173 |
| 10-10 weeks 6 days | 145 |
| 11-11 weeks 6 days | 117 |
| 12-12 weeks 6 days | 117 |

**Table 2: Study of Nuchal translucency findings**

| Nuchal translucency | No. of patients | Percentage (%) |
|---|---|---|
| Not done | 564 | 74.2 |
| 0.1 to 1.0 | 70 | 9.2 |
| 1.1 to 2.0 | 126 | 16.2 |


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**Table 3: Findings of ultra sonography. No. of patients: 760.**

| Scan findings | Number (760) | Percentage (%) |
|---|---|---|
| Normal pregnancy | 606 | 79.7 |
| Brightened ovum | 8 | 1.05 |
| Embryonic demise | 16 | 2.10 |
| Wrong dates | 114 | 15 |
| Uterine mass (fibroid) | 8 | 1.05 |
| Ectopic pregnancy | 8 | 1.05 |

**Table 4: Comparative of Gestational age and CRL by USG.**

| Gestational ages (weeks) | No. of patients | Mean of crown rump length mm (±SD) |
|---|---|---|
| 6-6 weeks 6 days | 7 | 13.8 (± 0) 0 |
| 7-7 weeks 6 days | 7 | 14.09 (± 0) 0 |
| 8-8 weeks 6 days | 194 | 19.30 (± 2.62) |
| 9-9 weeks 6 days | 173 | 29.20 (± 3.96) |
| 10-10 weeks 6 days | 145 | 41.05 (± 3.36) |
| 11-11 weeks 6 days | 117 | 56.40 (±6.58) |
| 12-12 weeks 6 days | 117 | 65.05 (± 4.80 |
| Total | 760 | 36.45 (± 15.70) |

**Table 5: Comparative of Mean Yolk sac diameter according to gestational age.**

| Gestational age weeks | No. of patients (760) | Mean yolk sac diameter (mm) (± SD) |
|---|---|---|
| 6-6 weeks 6 days | 7 | 2.10 (± 0) |
| 7-7 weeks 6 days | 7 | 2.35 (± 0) |
| 8-8 weeks 6 days | 194 | 3.45 (± 1.96) |
| 9-9 weeks 6 days | 173 | 4.20 (± 2.15) |
| 10-10 weeks 6 days | 145 | 4.66 (± 1.55) |
| 11-11 weeks 6 days | 117 | 3.42 (± 1.98) |
| 12-12 weeks 6 days | 117 | 2.95 (± 1.76) |
| Total | 760 | 3.30 (± 1.35) |

## DISCUSSION

Present USG study in first trimester pregnancy and clinical outcomes. Distribution of women by gestational age (GA), The highest number of patients was 8–8 weeks. 6 days were 194, followed by 9-9 weeks 6 days, and the least were 7 patients in 6-6 weeks 6 days and 7-7 weeks 6 days, respectively [Table 1]. In the nuchal translucency study, 70 (9.2%) patients had 0.1 to 1.0 mm, and 12.6 (± 16.5%) had 1.1 to 2.0 mm [Table 2]. USG findings had 8 (1.05%) had brightened ovum, 16 (2.1%) embryonic demise, 114 (15%) had wrong dates, 8 (1%) fibroid mass, and 8 (1.1%) ectopic pregnancies [Table 3]. In the competitive study of GA and CRL, the total mean value was 36.45 (± 15.70) [Table 4]. In comparison, GA and diameter of yolk sac total mean value was 3.30 (± 1.35) [Table 5] [Figure 1-4]. These findings are more or less in agreement with previous studies.[5-7]

USG is one of the most important tools for antenatal care, which is the preventive arm of obstetric medicine. USG is a crucial component of both high-risk and low-risk pregnancies during first trimester pregnancies. E.g., first trimester vaginal bleeding, detection of fetal anomalies. USG plays a vital role in the detection of early gestation. The earliest sign of intrauterine gestation is an echogenic area within the thickened deciduas, and it can be seen as early as 25 days menstrual age,[8] pregnant women exposed to radiations. Smoking and alcohol usage of certain drugs lead to defects in the neural tube, which can be seen in the first trimester of pregnancy. Spontaneous preterm labor accounts for around 60.70% of all pattern deliveries and thus makes a significant contribution to prenatal morbidity and mortality, mainly predicted in the first trimester study. Moreover, gestational diabetes in the first trimester of pregnancy includes sex hormone-binding globulin (SHBG), a highly sensitive C-reactive protein, and adiponectin, which may retard the growth of the fetus in a later stage of pregnancy.[9] Growth-restricted infants are overrepresented in perinatal morbidity and mortality statistics and have an increased lifetime risk of cardiovascular and metabolic disease; hence, first trimester CR length has clinical significance in growth retardation predictability.[10]

In the first trimester of pregnancy, biomarkers are fetal nuchal translucency, uterine artery pulsation, and placental growth factors, which are the best predictors for later pregnancy complications.

In the normal USG study, the following criteria were observed: presence of a yolk sac within the gestational uterine pregnancy. Embryo should be visualized when MSD (Mean Sac diameter) is at least 25 mm otherwise considered as an embryonic pregnancy. Gestational age by CRL is within 5 days of GA calculated by LMP method. Presence of fetal heart rate Nuchal transluceny value less than 4 mm viewed from 11th week absence of pelthe yolk or adnexal pathology.[11] These findings, including the diameter of the yolk sac and CR length, can predict the clinical outcomes of morbidity and mortalities.

## CONCLUSION

USG is a noninvasive, non-radioactive, effective, easily accessible, and cost-effective tool to find out


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normalcy or abnormalities in fetal growth, location and position of placenta viability, and movements of the fetus. USG is mandatory during pregnancy for prediction of low-risk or high-risk for both fetus and mother.

**Limitation of study:** Owing to the tertiary location of the research center, the small number of patients, and the lack of the latest techniques, we have limited findings and results.

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