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# Demographic Analysis and Pregnancy Outcome by Yolk Sac Tool during First Trimester: Observational Study

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**Abstract**

**Background:** Human reproduction is a relatively ineffective process. It is estimated that spontaneous abortion occurs in 10% - 25% of clinically recognized pregnancies[1]. If we consider pregnancies starting at the implementation stage, the frequency of spontaneous abortion is 30-40%[2]. For this reason and in view of the anxiety a couple may undergo waiting for a successful outcome, many authors have studied the prognosis of pregnancy based on ultrasound criteria obtained during the first trimester of pregnancy. The yolk sac functions as the primary route of exchange between the embryo and mother prior to the establishment of the placental circulation. To find out normal size and shape of the yolk sac in pregnancies between 5-12 weeks of gestation, its association with pregnancy outcome and correlation of various fetal parameters with mean yolk sac diameter.

**Methods:** 197 Antenatal patients in the first trimester attending op for routine visits or with first trimester bleeding in the department of obstetrics & gynecology at tertiary care hospital, were randomly selected for this study from August 2005 to April 2008. It is a retrospective observational study.

**Results**: In pregnancies with normal outcome (n=150), the YSD was progressively increased from 0.2cm at 6 weeks of GA to 0.8 cm at 9.4 weeks of GA. The mean YS was 0.49cm with Standard deviation of 0.116cm. 92.1% had yolk sac diameter of less than < 0.6cm and 7.9% had diameter of >0.6cm. 18% of pregnancies with normal yolk sac size were aborted were as 47% of pregnancies with large yolk sac were aborted. There was correlation between yolk sac diameter and outcome of the pregnancy and it was statistically significant.

**Conclusions**: In this study no normal pregnancy had YS diameter more than 5.6mm below 10 weeks of gestation. In present study showed that large yolk sac >.6cm was associated with a poor pregnancy out come. Of the 189 patients in whom yolk sac was visualized 15 had large yolk sac and 7 of them aborted. Large yolk sac size was found to be 18% sensitive and 95% specific in predicting subsequent pregnancy loss. It is valuable tool in predicting the outcome of the pregnancy.

**Keywords**: Pregnancy, Yolk sac, missed abortion.

## Introduction:

Accurate differentiation between normal pregnancy and pregnancy loss in early gestation remains a clinical challenge[3]. It is estimated that approximately 30-40% of implanted pregnancies results in spontaneous abortion during first trimester[4.] In the first trimester yolk sac is the primary source of exchange between mother and fetus, before placental circulation is established[5]. It has haematopoitic, metabolic, secretory, excretory, immunogenic functions[6]. The primary YS form at approximately 24 days of menstrual age. As the

extraembryonicccelom forms, the primary YS is pinched off and the secondary YS is formed at 27-28 days of menstrual age, which is the first embryonic structure visualized in gestational sac sonographically[5]. In this study we assess the value of yolk sac in predicting the pregnancy outcome during first trimester and to assess the pregnancy outcome with demographic structure of age and parity.

**Methods:**

This is a retrospective observational study. This study was conducted on 197 women in the Antenatal patients in the first trimester attending op for routine visits or with first trimester bleeding in the department of obstetrics & gynecology at tertiary care hospital, were randomly selected for this study from August 2005 to April 2008.

Inclusion Criteria:

1. Antenatal women with 5-12 weeks of gestation
2. History of first trimester bleeding

**Exclusion Criteria:**

1. Women opting for MTP
2. Documented fetal demise
3. History of usage of abortificient drugs
4. Advance maternal age
5. Molar pregnancy
6. Ectopic pregnancy

After obtaining consent, transvaginal scan was done on all the selected patients and following parameters were noted.

- Gestational sac diameter in cm
- Yolk sac diameter

In women with regular menstrual cycles and who were sure of their last menstrual period gestational age was calculated on the basis of the last menstrual period. In women with irregular cycles the ultrasound gestational age was taken into account. The indication for the scan was noted. After the first ultrasound the pregnancy was followed upto Termination. Subsequent scans were done only if there were repeated episodes of bleeding or pain abdomen.

Only the first ultrasound was taken for the analysis, the parameters from the subsequent scans were not used for analysis.

The outcome was classified into

- Live Birth
- Pregnancy loss which included both missed and spontaneous abortion and intrauterine demise.

Other antepartum and intrapartum complications noted were:

- Fetel distress
- Iugr
- Preeclampsia
- Abruption placenta
- Placenta previa
- Oligohydramnios
- Preterm delivery

From the parameters that were noted 2 additional signs of prognostic significance were derived

- Difference between Gestational sac diameter and Crown rump length in millimeters(GSD-CRL),
- Difference between gestational age in weeks and trophoblastic thickness in millimeters (mm).

Statistical test of significance used was the chi-square test for the comparison of categorical data.

**Results:**

$H_0$ = There is no difference between yolk sac diameter and outcome of pregnancy.

$H_1$ = There is difference between yolk sac diameter and outcome of pregnancy.

Table 1: Yolk sac versus Outcome of pregnancy

| Yolk sac | OUTCOME OF PREGNANCY | |
|---|---|---|

| | LIVE BIRTH | | PREGNANCY LOSS | | TOTAL |
|---|---|---|---|---|---|
| <0.6cm | 142 | 82% | 32 | 18% | 174 (92%) |
| >0.6cm | 8 | 53% | 7 | 47% | 15 (8%) |
| TOTAL | 150 | 79.4% | 39 | 20.6% | 189 (100%) |

There exist an association between the yolk sac diameter and pregnancy outcome since the chi- square value is 6.74 at degrees of freedom is 1; the level of significance is 0.05. The p- value is 0.009418.

**Result:** Since the calculated chi-square value 6.7418 is greater than the table value 3.84. So, the attributes that yolk sac diameter between live birth and pregnancy loss are not independent and hence there is a difference in pregnancy outcome that live birth and pregnancy loss and the size of the yolk sac diameter and it was statistically significant at p-value < 0.05. This proved that there is a significant difference in pregnancy outcome between Live Birth and Pregnancy Loss and yolk sac diameter during the first trimester.

Table 2: Transvaginal ultrasound scan of pregnant women during their first Trimester visit.

| Variable | N | Range | Min | Max | Mean | StdDev. |
|---|---|---|---|---|---|---|
| GA(dates) | 180 | 6.9 | 5.1 | 12 | 8.14 | 1.43 |
| GA(scan) | 197 | 6.4 | 5.6 | 12 | 7.82 | 1.3 |
| GSD | 197 | 5.6 | 1cm | 6.6 | 2.89 | 1.18 |
| CRL | 195 | 5 | 0.3cm | 5.3 | 1.53 | 0.95 |
| YS | 189 | 0.8 | 0.2 | 1 | 0.49 | 0.116 |
| Trophoblastic Thickness (TT) | 197 | 1.1 | 0.1 | 1.2 | 0.5262 | 0.1858 |
| GSD-CRL | 195 | 3.2 | 0.1 | 3.3 | 1.35 | 0.5751 |
| GA-TT | 197 | 6.5 | 0 | 6.5mm | 2.65mm | 1.37mm |

The table 2 shows the various variables and its measures of central tendency and dispersion obtained from the transvaginal ultrasound scan done for the pregnant women who visited the hospital during their first trimester.

Table 3: Age Vs Outcome

| Age | Live Birth | | Pregnancy Loss | | Total |
|---|---|---|---|---|---|
| < 20 | 13 | 76.4% | 4 | 23.6% | 17 |
| 21-25 | 87 | 79% | 23 | 21% | 110 |
| 26-30 | 48 | 87.2% | 7 | 12.8% | 55 |
| 31-35 | 10 | 71.4% | 4 | 28.6% | 14 |
| >36 | 0 | 0 | 1 | 100% | 1 |
| | 158 | | 39 | | 197 |

Figure 1 Age Vs Outcome

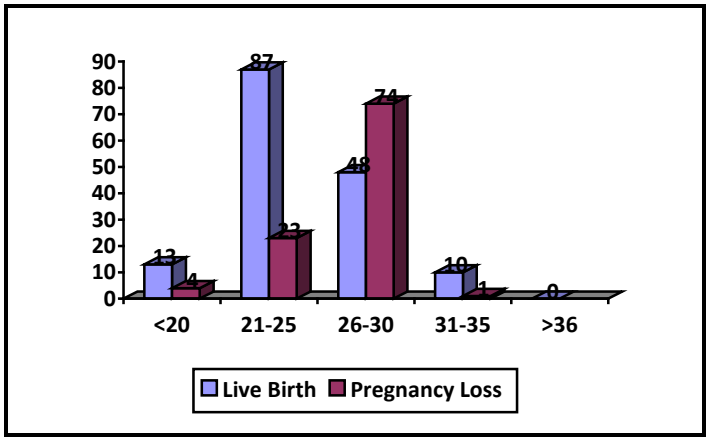


Table 3 and Figure 1 shows the outcome of the pregnancy in relation to the age group of the patient. The correlation between maternal age an outcome was not statistically significant, p-value = 1.52

Table 4 Parity Vs Outcome

| Parity | Live Birth | | Pregnancy Loss | | Total |
|---|---|---|---|---|---|
| Primi | 92 | 83% | 19 | 17% | 111 |
| Multi | 66 | 77% | 20 | 23% | 86 |
| Total | 158 | | 39 | | 197 |

The table 4 shows parity distribution of live birth and pregnancy loss. It reveals that 111 primigravida 17% had pregnancy loss, while 23% multigravida had pregnancy loss.

**Table 5: Compliation Based On GSD-CRL**

| | GSD-CRL < 10.1 | GSD-CRL > 10.1 |
|---|---|---|
| No Complication | 57 (80.3%) | 114 (91.90%) |
| IUGR | 3(4.20%) | 1 (0.80%) |
| Fetal distress | 2 (2.80%) | 3(2.40%) |
| Preeclampsia | 2(2.80%) | 0 |
| Preterm delivery | 2(2.80%) | 1(0.80%) |
| Placenta Previa | 1(1.40%) | 0 |
| Abruption Plancenta | 0 | 1(0.80%) |
| IUGR/preeclampsia | 0 | 2(1.60%) |
| IUGR/Oligohydramnios | 1(1.40%) | 1(0.80%) |
| IUGR / Fetal distress | 1(1.40%) | 0 |
| Preeclampsia/ preterm delivery | 0 | 1(0.80%) |
| Fetal distress and Oligohydramnios | 3(4.20%) | 0 |
| Total | 72 | 124 |

The table 5 shows the various complications analyzed in relation to the sac size, there was statistically significant correlation between the two P value=0.017. But the incidence of individual complications were not significantly different between women who had Gsd-CRl <0.10.1mm and in those with values more than 10.1mm

**Discussion:**

In present study we have selected about 197 antenatal patients in the first trimester and have done transvaginal ultrasound, documenting the mean sac diameter, the crown rump length, yolk sac diameter etc. Using these parameters we have calculated the difference between GSD & CRL(GSD-CRL) and the difference between the gestational age and trophoblastic thickness (GA-TT) and with these variables we have tried to predict the outcome of pregnancies.

In the study by Daniel J. Lindsay[5], YS diameter more than 2 standard deviation, when compared with the gestational sac diameter allowed prediction of abnormal outcome of pregnancy. In this study no normal pregnancy had YS diameter more than 5.6mm below 10 weeks of gestation and the early rapid growth of the YS was followed by a more gradual but constant growth rate thereafter.

Our study also showed that large yolk sac >0.6mm was associated with poor pregnancy outcome. Of the 189 patients in whom yolk sac was visualized 15 had large yolk sac and 7 of them aborted. Large yolk sac size was found to be 18% sensitive and 95% specific in predicting subsequent pregnancy loss. There was statistically significant correlation between the yolk sac and outcome of the pregnancy.

**Conclusion**

Ultra sound in the first trimester of pregnancy that evaluates all the parameters mentioned in this study, is a valuable tool in predicting the outcome of the pregnancy. The pregnancy loss high in the age <20 and (31-35) was seen in this study. The pregnancy loss was high in multigravida than in primigravida. There was statistically significant correlation between yolk sac diameter and outcome of the pregnancy.

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