

# Correlational Analysis of Yolk Sac Size and Pregnancy Outcome: An Ultrasonographic Study

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## ABSTRACT

**Introduction:** A blighted ovum can be diagnosed with certainty using transvaginal sonography when the average diameter of the gestational sac is greater than 8 mm without a yolk sac, or when the average diameter of the gestational sac is greater than 16 mm without an embryo. A gestational sac larger than 20 mm without a yolk sac or 25 mm without an embryo, detected during transabdominal examination, indicates the presence of a blighted ovum.

**Materials & Methods:** A comprehensive medical and surgical history was obtained to exclude any conditions that could potentially impact our investigation. A comprehensive evaluation, including a detailed examination of both general and physical aspects, was conducted. The study included uncomplicated singleton pregnancies with a gestational age between 6-12 weeks.

**Results:** Total 49 subjects were included in study. Gestation age was statistically significant ( $P>0.05$ ). Yolk sac was found enlarged in 5 subjects, small in 2 subjects and normal in 2 subjects.

**Conclusion:** A strong and statistically significant link was seen

between the size of the yolk sac and the outcome of pregnancy. Anomalies in the size of the yolk sac can serve as a reliable predictor of early pregnancy loss, even prior to the evaluation of fetal structure via an ultrasound examination.

**Keywords:** Sonography, Transabdominal, Examination.

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## Article History:

**Received:** 07-08-2018, **Revised:** 01-09-2018, **Accepted:** 19-09-2018

## Access this article online

Website: <a href="http://www.ijmrp.com">www.ijmrp.com</a>	Quick Response code 
DOI: 10.21276/ijmrp.2018.4.5.093	

## INTRODUCTION

The yolk sac is a crucial landmark that indicates the presence of a genuine gestational sac.<sup>1,2</sup> Sonography reveals the yolk sac as a circular formation consisting of a center that lacks echoes and is surrounded by a distinct and clearly visible rim that reflects sound waves. The yolk sac typically has a diameter ranging from 2 to 5 mm and grows until the 10th week of gestation.<sup>3</sup> A blighted ovum can be diagnosed with certainty using transvaginal sonography when the average diameter of the gestational sac is greater than 8 mm without a yolk sac, or when the average diameter of the gestational sac is greater than 16 mm without an embryo. A gestational sac larger than 20 mm without a yolk sac or 25 mm without an embryo, detected during transabdominal examination, indicates the presence of a blighted ovum.<sup>4</sup>

According to several studies, the presence of an expanded or small yolk sac during pregnancy is associated with a negative outcome. Contrary to a few studies, it has been found that a pregnancy can still have a normal outcome even if there is an

enormous or small yolk sac. Thus, further work is needed to determine its impact on gestational outcomes. The objective of this study is to assess the size of the yolk sac and determine its correlation with the outcome of pregnancy.

## MATERIALS AND METHODS

The study was conducted among 50 pregnant women in their first trimester of pregnancy with transvaginal sonography. The present study obtained authorization from the ethical committee of the Institution.

A comprehensive medical and surgical history was obtained to exclude any conditions that could potentially impact our investigation. A comprehensive evaluation, including a detailed examination of both general and physical aspects, was conducted. The study included uncomplicated singleton pregnancies with a gestational age between 6-12 weeks. Women with structural anomalies of the uterus and cervix, known medical disorders that

can cause abnormal pregnancy outcomes (such as anemia, hyperthyroidism, diabetes mellitus, chronic hypertension, molar pregnancy), and patients who refused transvaginal sonography or follow-up were excluded from the study.

Prior consent was obtained from all study patients for the transvaginal scan. The Logiq Pro 5 equipment of GE Healthcare was utilized, equipped with a 7-12 M Hz TVS probe. The sonography was performed using a bladder that was not filled with urine. The process was thoroughly described to the patient and their consent was obtained. Before insertion, the endovaginal transducer was coated with a sterile condom lubricated with gel. The patient was positioned in the lithotomy position with a modest reverse Trendelenburg tilt. The transducer was inserted roughly 6-

8 cm into the vagina. Scanning was conducted in both the coronal and sagittal planes. The uterus was initially scanned, followed by the adnexa, and ultimately the cul-de-sac.

The presence of the gestational sac and yolk sac was detected, and the diameter of the inner yolk sac was measured by using calipers positioned at the inner edge. The accepted range for the diameter was 2-5 mm.

A yolk sac measuring less than 5 mm in diameter and further classified as small if the diameter was less than 2 mm. The patients were monitored until 20 weeks of gestation. A normal pregnancy outcome was defined as one that continued beyond 20 weeks, whereas an unfavorable outcome was judged to be an abortion.

**Table 1: Yoc Sac wise distribution**

Yolk Sac	(n)
Present	49
Absent	1
Total	50

**Table 2: Gestational age wise distribution of study subjects**

Gestational age in weeks	n	Mean± Std. Deviation (mm)	p value
6	11	2.31±1.3	
7	17	3.1±1.6	
8	10	3.6±0.73	
9	5	4.2±0.7	
10	3	4.6±1.4	
11	3	3.24±.6	>0.05 (NS)
Total	49	3.7±1.8	

**Table 3: Outcome wise distribution of study subjects**

Yolk sac size	Outcome		Total	p value
	Abortion	Continued beyond 20 weeks		
Enlarged	5	0	5	
Normal	2	40	42	
Small	2	0	2	
Total	9	40	49	<0.001

## RESULTS

Table 1 shows that yolk sac was present in 49 subjects and absent in one subject so that total 49 subjects were included in study. Table 2 shows gestation age was statistically significant ( $P>0.05$ ). Table 3 shows yolk sac was found enlarged in 5 subjects, small in 2 subjects and normal in 2 subjects.

## DISCUSSION

In this study, 78% of the instances involved abortion due to an abnormal size of the yolk sac. In a study conducted by Adija P et al<sup>5</sup> this occurred in 35.71% of the cases. Kūçük T et al<sup>3</sup> abortions due to aberrant yolk sac size occurred in 64.5% of the cases. These numbers are far lower than the current findings. The disparity in results may be attributed to the limited sample size in the current investigation.

In the present study, the larger yolk sac was found to be the cause of 2 of the abortions. In a study conducted by Tan S et al<sup>6</sup>,

miscarriage happened in 37.5% of cases when an expanded yolk sac was present. Similarly, in a study by Adija P. et al<sup>5</sup>, miscarriage occurred in 80% of cases with big yolk sacs.

According to Rempen (1988)<sup>7</sup> our findings are consistent with the idea that a yolk sac that cannot be seen in vaginal sonography between 5 and 10 weeks of menstrual age, or a chorionic cavity diameter between 5 and 50mm with a yolk sac diameter exceeding 6mm, could indicate a problem in the early stages of pregnancy. In prospective research involving 377 singleton pregnancies, the detection rate and size of the yolk sac were assessed using vaginal sonography. Out of the total instances, 298 pregnancies were considered normal, whereas 79 pregnancies resulted in spontaneous abortions. Among the abortions, 18 were viable at the time of evaluation, while 61 were non-viable. The gestational age of 5 to 10 weeks reliably identified the presence of the yolk sac in 158 out of 172 normal pregnancies

(91.9%) and in all 14 viable pregnancies that were ultimately terminated. However, the yolk sac was only observed in 10 out of 29 non-viable pregnancies (34.5%) ( $p < 0.000005$ ). The chorionic cavity had a mean diameter ranging from 5 to 50 mm. The yolk sac was found in 237 out of 253 normal gestations (93.7%), in 16 out of 18 viable but later aborted gestations (88.9%), and only in 14 out of 41 non-viable gestations (34.1%) ( $p < 0.0000001$ ). A yolk sac diameter greater than 6mm was found in 5 out of 253 normal pregnancies (12.0%) and in 7 out of 29 spontaneous abortions (24.1%) ( $p < 0.0005$ ). No instances of normal development showed a diameter above 7mm, however in four cases of pregnancies with abnormal development (13.8%), a diameter above 7mm was seen ( $p < 0.001$ ). None of the instances in the current investigation exhibited yolk sac enlargement beyond 20 weeks. This conclusion contradicts the findings Berdahl DM et al and of Küçük T et al.<sup>3</sup> According to the findings, 28.57% and 66.25% of the instances with enlarged yolk sac had a normal outcome. Consistent with the aforementioned investigations, the findings of the study conducted by Moradan S et al<sup>8</sup> also demonstrated that the size of the yolk sac played a significant role in predicting spontaneous abortion. Therefore, it aligns with the findings of the current research. Based on the research conducted by M. Alinowski et al<sup>9</sup>, the presence of a big yolk sac is an indicator of an unfavorable pregnancy outcome.

Tan et al. (2011)<sup>6</sup> contradicted our findings and asserted that there is no correlation between an uneven yolk sac form and size and an elevated risk of spontaneous abortion. The transvaginal sonography technique was used to evaluate the dimensions and proportions of the yolk sac in a sample of 183 women with uncomplicated pregnancies, ranging from 6 to 8 weeks of gestation. The majority of the embryos, specifically 152 out of 183 (83%), exhibited a yolk sac with a regular structure. Conversely, the remaining embryos, 31 out of 183 (17%), displayed a yolk sac with an irregular shape. While there was a tendency for a decrease in the occurrence of abnormal yolk sacs as the pregnancy progressed, the difference was not statistically significant ( $p = 0.13$ ). Out of 183 pregnancies, 6 experienced spontaneous abortion, which accounts for 3.3% of the total. Specifically, one out of the 31 pregnancies (3.2%) with an irregular yolk sac form resulted in spontaneous abortion, while five out of the 152 pregnancies (3.3%) with a regular yolk sac shape also ended in spontaneous abortion. The rates of spontaneous abortion were statistically indistinguishable between pregnancies with a regular yolk sac shape and those with an irregular shape ( $p > .99$ ).

## CONCLUSION

A strong and statistically significant link was seen between the size of the yolk sac and the outcome of pregnancy. Anomalies in

the size of the yolk sac can serve as a reliable predictor of early pregnancy loss, even prior to the evaluation of fetal structure via an ultrasound examination.

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**Source of Support:** Nil.

**Conflict of Interest:** None Declared.

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**Cite this article as:** S Vijaya Laxmi, T Sharmila. Correlational Analysis of Yolk Sac Size and Pregnancy Outcome: An Ultrasonographic Study. *Int J Med Res Prof.* 2018 Sept; 4(5): 389-91. DOI:10.21276/ijmrp.2018.4.5.093