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**Original Article**

# Ultrasound Diagnosis and Risk Factors of 1st Trimester Complications in Pregnancy

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## ABSTRACT

Ultrasound provides accurate gestational age and diagnosis of any complications. The complication can be due to nulliparity, aged females, and a history of abortion. The common complications of the first trimester are blighted ovum, ectopic pregnancy, and abortion. **Objective:** To determine the risk factors causing complications of pregnancy in the first trimester. **Methods:** This retrospective study was performed with a sample size of 60 patients in 6 months, calculated via convenient sampling technique by taking mean from previously published studies. This study was carried out at 3 private hospitals in Gujrat, Pakistan. An ultrasound machine (Aplio 300) was used to evaluate females with early pregnancy loss after informed consent. Data were statistically analyzed using SPSS version 28. Frequency and percentages were mentioned for age groups, Obstetrical history, and ultrasound findings. **Results:** The most common complication in 1st Trimester was incomplete abortion (29, 48.3%) following Missed abortion 17(28.3%). The risk factors causing complications were gravidity, parity, abortions, fibroids, trauma, and molar pregnancy. The age group of 30-39 years has the maximum number of patients (30, 50%) diagnosed with complications. The common risk factor causing complication was due to age 30(50%), trauma 18(30%), gravidities were G4 (14, 23.3%) and G2 (10, 16.7%) and Parity P1 (19 patients, 31.7%) and P2 (14 patients, 23.3%) **Conclusions:** In conclusion, the incidence of complication increased in nulliparous, aged females and decreased in females having less gravidity. Patients with a history of abdominal pain and vaginal bleeding were noticed to have a higher incidence of complications. Nulliparous and multiparous women having poor obstetrical history are at high risk. Transvaginal ultrasound is very effective in diagnosing ectopic pregnancy and missed abortion.

## INTRODUCTION

The effectiveness of sonographic evaluation in the first trimester is most reliable in detecting the normal and abnormal growth and development of the fetus and other intrauterine investigations [1]. Nowadays gynecologists are routinely using ultrasound to examine fetal well-being throughout pregnancy [2]. Regardless of this, ultrasound examination in routine clinical practice is less due to less diagnostic transabdominal accuracy in the first trimester but now with the revolutionary transvaginal ultrasound, there is improvement in the detection of first trimester complications at a very early stage and decision making whether to keep on with the pregnancy or abort in abnormal cases such as ectopic pregnancy [3,4]. Ultrasound examination before birth is routinely practiced in the United States but there is still controversy regarding whether ultrasound screening enhances the better pregnancy outcome [5]. Now, the American College of Radiology (ACR) recommend sonographic evaluation in specified medical indications and forbid the causal ultrasound evaluation in pregnancy [6]. American college of Obstetricians and Gynecologists (ACOG) also recommend that the benefits, limitations, and procedure of ultrasound must be properly explained to females before the examination [7,8]. Prenatal ultrasound examination enables the provision of better postnatal care [9]. Prenatal ultrasound examinations include the evaluation of

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estimated date of delivery, fetal viability, fetal biometry gestational age, multiple pregnancies with the number of fetuses and chronicity, amniotic fluid volume, placental location, and congenital anomalies if present [10,11]. Ultrasound provides a non-invasive and accurate measurement of gestational age and detection of any complications if present [12,13]. Appearance of the intrauterine gestational sac at approximately 5th week appears like cyst in a central portion of the uterus on ultrasound validate celomic cavity and yolk sac are the earliest anatomical structures that are formed [14,15]. Embryo is visualized along with yolk sac at about 6h week and cardiac flicker is also visualized at that time [16,17]. Throughout the world, in 2010 approximately 287,000 females die just because of childbirth-related complications [18]. In most of the rural areas of Pakistan there is very limited provision of medical care and therefore there is a necessity of identification of pregnant females whose pregnancy has increased risk of complications to be properly evaluated and screened by ultrasound [19,20]. The prevalent risk factors of complication in the first trimester are chromosomal anomalies, teratogens exposure, hormonal issues, pregnancy with IUCD, and uterine anomalies including Mullerian anomalies and incompetent cervix [21]. Chromosomal anomalies will result in autism, diverse trisomies, Down syndrome, Klinefelter's syndrome, and Turner syndrome. Chromosomal anomalies have a high incidence of approximately 60% [22,23]. The diagnosis of complicated pregnancy is absent embryo when a certain mean gestational sac diameter is found and absent cardiac activity when the certain crown-rump length of embryo is reached [24]. Other abnormal ultrasound findings include a retained product of conception, dead embryo, small gestational sac, blighted ovum, and large yolk sac [25]. Crown-rump length of approximately 5mm was suggested to accurately detect the complication in first-trimester pregnancy with absent cardiac activity [26,27]. Gestational sac size increases with the progression of pregnancy and 16mm diameter with absent embryo indicate failed pregnancy [28]. Types of complications of the first trimester are blighted ovum, incomplete abortion, complete abortion, ectopic pregnancy, inevitable abortion, missed abortion, and threatened abortion [29,30]. Complications in the first trimester can result from severe worse outcomes if pregnancy is continued so, this research explained the risk factors of complications in the first trimester by sonographic evaluation to reduce worse outcomes of pregnancy. This study enabled physicians to accurately determine risk factors of pregnancy complications in the first trimester by ultrasound effectively for early detection.

## METHODS

This is a retrospective study performed with a sample size of 60 patients, calculated via convenient sampling technique by taking mean from previous related studies [13,21,22]. The selected patients were presented to the ultrasound department of the private hospital in Gujrat, Pakistan for the assessment of their first-trimester pregnancy with ultrasound machine using transabdominal convex of 3-5MHz and transvaginal probes of 7.5MHz. Females with clinical presentation of pelvic pain, pelvic mass, vaginal bleed, and poor history, after verbal agreement from patients, were included. Pregnant females in the 2nd and 3rd trimesters were excluded. Data were statistically analyzed with SPSS latest version. Graphs and tables were used for data summarization.

## RESULTS

In table 1 the frequency distribution of the sample's age is shown. Most patients were in age group of 30-39 years (30, 50%) and the least patients were in age group of 40-49 years (12, 20). Miscarriages were more frequent in females of old age. In table 2 frequency distribution of gravity of the sample is shown, the most frequent gravities were G4 (14, 23.3%) and G2 (10, 16.7%) and the lowest gravities were G6 (1, 1.7%) & G9 (2, 1.7%). The number of pregnancies had an inverse relation to complications in pregnancy. In table 3 frequency distribution of parity of sample is shown, the most frequent parities were P1 (19, 31.7%) and P2 (14, 23.3%) and the lowest parities were P5 (2, 3.3%), P6 (2, 3.3%), & P7 (2, 3.3%). There is a high risk of 1st-trimester complications in nulliparous females and a low risk of 1st-trimester complications in multiparous females having no history of complicated pregnancies. In table 4 frequency distribution of abortions in the sample is shown, the most frequent abortions were A1 (24, 40%) and A0 (18, 30%), and the lowest abortions were A3 (5, 8.3%) & A4 (2, 3.3%). The number of abortions had an inverse relation to complications in pregnancy. In table 5 frequency distribution of sonographic findings in a sample is shown, the most frequent sonographic findings were retained products of conception (29, 48.3%) and the lowest sonographic findings are empty gestational sac (2, 3.3%), tubo-ovarian mass (2, 3.3%) and viable fetus (2, 3.3%). Sonographic findings were related to the type of complications. Table 6 shows the type of complication. Incomplete abortion (29, 48.3%) is most common. Threatened abortion (2, 3.3%), blighted ovum (2, 3.3%) and inevitable abortion (2, 3.3%) are rare. Table 7 show the causes of complications in 1st trimester. Trauma (18 patients, 30%) and fibroids (6 patients, 10%) are the most common causes and a majority of causes are unexplained

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(35 patients, 58.3%). Molar pregnancy (1 patient, 1.7%) is rare.

| Age groups | Frequency | Percent | Cumulative Percent |
|---|---|---|---|
| 20-29 | 18 | 30.0 | 30.0 |
| 30-39 | 30 | 50.0 | 80.0 |
| 40-49 | 12 | 20.0 | 100.0 |
| Total | 60 | 100.0 | |

**Table 1:** Frequencies of different age groups

| Gravida | Frequency | Percent | Cumulative Percent |
|---|---|---|---|
| G1 | 12 | 20.0 | 20.0 |
| G12 | 2 | 3.3 | 23.3 |
| G2 | 10 | 16.7 | 40.0 |
| G3 | 5 | 8.3 | 48.3 |
| G4 | 14 | 23.3 | 71.7 |
| G5 | 7 | 11.7 | 83.3 |
| G6 | 1 | 1.7 | 85.0 |
| G7 | 5 | 8.3 | 93.3 |
| G9 | 1 | 1.7 | 95.0 |
| G10 | 3 | 5.0 | 100.0 |
| Total | 60 | 100.0 | |

**Table 2:** Frequencies of gravida

| No. of para | Frequency | Percent | Cumulative Percent |
|---|---|---|---|
| P0 | 8 | 13.3 | 13.3 |
| P1 | 19 | 31.7 | 45.0 |
| P2 | 14 | 23.3 | 68.3 |
| P3 | 7 | 11.7 | 80.0 |
| P4 | 6 | 10.0 | 90.0 |
| P5 | 2 | 3.3 | 93.3 |
| P6 | 2 | 3.3 | 96.7 |
| P7 | 2 | 3.3 | 100.0 |
| Total | 60 | 100.0 | |

**Table 3:** Frequencies of parity

| No. of abortions | Frequency | Percent | Cumulative Percent |
|---|---|---|---|
| A0 | 18 | 30.0 | 30.0 |
| A1 | 24 | 40.0 | 70.0 |
| A2 | 11 | 18.3 | 88.3 |
| A3 | 5 | 8.3 | 96.7 |
| A4 | 2 | 3.3 | 100.0 |
| Total | 60 | 100.0 | |

**Table 4:** Frequencies of abortions

| Sonographic findings | Frequency | Percent | Cumulative Percent |
|---|---|---|---|
| Clear | 8 | 13.3 | 13.3 |
| Dead embryo | 17 | 28.3 | 41.7 |
| Empty gestational sac | 2 | 3.3 | 45.0 |
| Retained product of conception | 29 | 48.3 | 93.3 |
| Tubo -ovarian mass | 2 | 3.3 | 96.7 |
| Viable fetus | 2 | 3.3 | 100.0 |
| Total | 60 | 100.0 | |

**Table 5:** Frequencies of sonographic findings

| Type of complication | | | |
|---|---|---|---|
| Complications | Frequency | Percent | Cumulative Percent |
| Blighted ovum | 2 | 3.3 | 3.3 |
| Complete abortion | 6 | 10.0 | 13.3 |
| Ectopic pregnancy | 2 | 3.3 | 16.7 |
| Incomplete abortion | 29 | 48.3 | 65.0 |
| Inevitable abortion | 2 | 3.3 | 68.3 |
| Missed abortion | 17 | 28.3 | 96.7 |
| Threatened abortion | 2 | 3.3 | 100.0 |
| Total | 60 | 100.0 | |

**Table 6:** Frequencies of type of complication

| Causes | Frequency | Percent | Cumulative Percent |
|---|---|---|---|
| Fibroid | 6 | 10.0 | 10.0 |
| Molar | 1 | 1.7 | 11.7 |
| Trauma | 18 | 30.0 | 41.7 |
| Unexplained | 35 | 58.3 | 100.0 |
| Total | 60 | 100.0 | |

**Table 7:** Frequencies of causes of complication

## DISCUSSION

Miscarriage is referred to as the death of a fetus before 20 weeks of gestation. Fetal demise in utero is fetal death after 20 weeks of gestation. Pregnant females in the first trimester need special care as there are more frequent cases of pregnancy loss at this time. Serious psychological, medical and financial implications cause 1st-trimester complications such as ectopic pregnancy, miscarriages, and abortions. The status of a female to deliver viable offspring is known as parity. The 'para' word and letter 'P' are used to denote parity and it is referred to as a total number of pregnancies. Effective and timely diagnosis aid in the reduction of such consequences. This study was intended to find the effectiveness of diagnostic ultrasound in finding the risk factors of complications in 1st trimester of pregnancy. In the current study, the sample characteristics were gone over in-depth below to draw general conclusions about the reason for complications in 1st trimester for the total patient population. A cross-sectional study of Suliman et al., published in 2017 in Sudan explains the causes of complication by examining the 40 patients which included 1st trimester pregnant females with presenting complain of vaginal bleeding with highest frequency in age group of 25-34 years (20, 50%) and lowest in 45-54 years (1, 2.5%). It also showed that nulligravida females have a higher risk of complicated pregnancy outcomes as G5 & G7 (12.5%) were highest and G11 was lowest. Previous pregnancy has an impact on present pregnancy. Miscarriages are more frequent in females of old age [22].

## CONCLUSION

In conclusion, the incidence of complication increased in nulliparous, aged females and decreased in females having less gravidity. Patients having a history of abdominal pain

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and vaginal bleeding were noticed to have a higher incidence of complications. 1st-trimester complications were diagnosed effectively on ultrasonography. Due to sonographic evaluation rate of mortality and morbidity due to 1st trimester is decreasing. Pregnant females who present with complaints of vaginal bleeding were diagnosed on ultrasound and timely managed.

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