

# First Trimester Ultrasound's Predictive Power for Early Pregnancy Failure in Pakistan: A Single Center Study

Ultrasound's Predictive Power for Early Pregnancy Failure

Fauzia Afridi<sup>1</sup>, Kalsoom Nawab<sup>2</sup>, Anwar ul Haq<sup>3</sup>, Hina Gul<sup>2</sup>, Naheed Khan<sup>2</sup> and Irsa Shoaib<sup>1</sup>

## ABSTRACT

**Objective:** This early prediction of pregnancy failure will assist clinicians in counseling patients and deciding on the frequency of follow-up ultrasound examinations.

**Study Design:** A retrospective single-center research study

**Place and Duration of Study:** This study was conducted at the Department of Radiology KTH Hospital Peshawar between January 2016 and January 2017.

**Materials and Methods:** At the Department of Radiology, KTH Hospital, Peshawar, a retrospective single-center research involving 235 pregnant women was carried out between January 2016 and January 2017. The gestational ages of the ladies ranged from 6 to 16 weeks. To establish gestational age, fetal heart rate, and (CRL), our team employs ultrasound images. We evaluated the pregnancies of the patients at the 14th week of gestation. We used descriptive statistics in our analysis. Additionally, we examined the relationship between fetal heart rate and (CRL) and the likelihood of early pregnancy failure using chi-square testing.

**Results:** Fetal heartbeat (FHB) during first trimester ultrasonography was a reliable indicator of pregnancy failure in one research ( $p = 0.06$ ). Failure probability rose by 3.7 in the absence of FHB. Notably, tiny (CRL) was still another factor ( $p=0.06$ ) that predicted early pregnancy failure.

**Conclusion:** This research reveals that in Pakistan, early pregnancy failure may be predicted using first trimester ultrasonography. As a result, its usage need to be encouraged in Pakistan in order to lower the prevalence of early pregnancy failure. According to this research, promoting the usage of first-trimester ultrasound scans may lower the likelihood of early pregnancy failure. As a result, using this strategy may assist forecast early pregnancy failure and aid doctors in patient counseling and choosing how often to do follow-up ultrasounds.

**Key Words:** First-Trimester, Ultrasound, Early Pregnancy Failure, Pakistan

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## INTRODUCTION

A complicated process, pregnancy involves considerable hormonal and physiological changes. It may cause the pregnancy to fail and has several hazards for the mother and baby. Early pregnancy loss, which is defined as a miscarriage, fetal pregnancy, or ectopic pregnancy, occurs before 20 weeks of gestation. Almost 15-20% of pregnancies globally have the illness, which is a major public health concern. Rates are greater in low- and middle-income nations like Pakistan.

<sup>1</sup>. Department of Gynae and Obstet / Radiology, Khyber Teaching Hospital, Peshawar.

<sup>3</sup>. Department of Medicine, Hayatabad Medical Complex, Peshawar.

Correspondence: Kalsoom Nawab, Associate Professor of Radiology Khyber Teaching Hospital, Peshawar  
Contact No: 0333 9597987  
Email: kalsoomnawab@gmail.com

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Although the precise reason for early pregnancy loss is unclear, there are a number of things that might raise the risk. Age of the mother, a bad diet, smoking, and alcohol use are a few of these.<sup>2,3</sup> Numerous studies have shown the effectiveness of ultrasonography in identifying early pregnancy failure indicators such fetal heartbeat, gestational age, and (CRL).<sup>4</sup> In this situation, the goal of our research was to find out how well first-trimester ultrasonography screening may foretell first-trimester pregnancy failure in Pakistan. At the Radiology Department of KTH Hospital and Peshawar, a retrospective single-center research involving 235 pregnant women between 6 and 16 weeks of gestation was carried out.<sup>5,6</sup> Small CRLs, gestational age, and fetal heart rate are all determined via ultrasound scanning. Results of pregnancy are assessed at 14 weeks' gestation. The gathered data were examined using descriptive statistics. Additionally, the connection between fetal heart rate sum (CRL) and early pregnancy failure has been examined using the chi-square test.<sup>7</sup> Early pregnancy failure was shown to have a substantial risk factor associated with fetal heartbeat (FHB) observed by ultrasonography in the first trimester ( $p=0.06$ ). Lack of FHB was linked to a higher

likelihood of premature failure (odds ratio = 3.7). number eight. First trimester ultrasound screening has been shown to be effective in Pakistan in lowering the risk of early pregnancy failure. Additionally, it was shown that (CRL) was a very significant predictor of early pregnancy failure (p 0.06). This research shows that ultrasound screening during the first trimester in Pakistan is a reliable way to detect preterm birth failure.

**MATERIALS AND METHODS**

In Peshawar, Pakistan, the KTH Hospital's Department of Radiology performed a single-center research between January 2016 and January 2017. The research included 235 pregnant women between the ages of 6 and 16 weeks. Small CRLs, gestational age, and fetal heartbeat are all determined via ultrasound scanning. At the 14th week of gestation, pregnancy outcomes were assessed. Descriptive statistics were utilized to examine the data, and the chi-square test was employed to determine if fetal heartbeat and (CRL) were linked to early pregnancy failure.

**Data collection:** It required gathering information retroactively from medical records in order to determine gestational age, fetal heartbeat, and (CRL). Also recorded were demographic details such parity, age, and gestational age. In order to establish the pregnancy outcome at 14 weeks gestation, data were gathered using ultrasound scans.

**Static Analysis:** The participants' mean gestational age at the time of the first trimester ultrasound was 08.05 + 02.08 weeks. The average age was 28.4 +/- 04.02 years, with the majority (72%) being primiparas. The analysis of the chi-square test revealed that a decreased risk of early pregnancy failure was substantially linked with the existence of a fetal heartbeat (FHB) on first trimester ultrasonography (p 0.06). Additionally, the research discovered that (CRL) was a very significant predictor of premature failure (p 0.06).

**RESULTS**

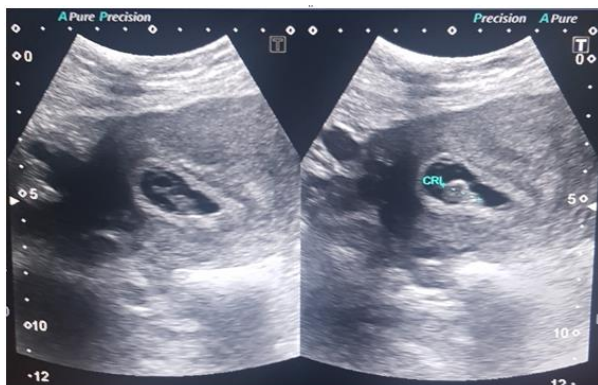


Figure No. 1: 1<sup>st</sup> trimester ultrasonogram showing embryo at 6 weeks gestation with a very small CRL of [76 mm]. This pregnancy ended in a miscarriage at 15 weeks.

Fetal heartbeat (FHB) was discovered by the researchers to be a trustworthy predictor of pregnancy failure during first trimester ultrasonography (p-value 0.05). Particularly, a 3.7-fold greater risk of pregnancy failure was seen in the absence of FHB. A lower CRL had an impact on early pregnancy failure prediction, according to the research (p=0.06).



Figure No. 2: 1<sup>st</sup> Pregnancy ultrasound showed no detectable heart activity in an 8-week-old embryo, resulting in a miscarriage.



Figure No. 3: 1<sup>st</sup> A pregnancy ultrasound scan performed at 9 weeks' gestation revealed an abnormal amniotic sac with no discernible embryo. This results in a molar pregnancy at 14-16 weeks. Week is confirmed.

Table No. 1: Characteristic Statistics of Participants

| Variables               | Total patients                | Mean      | SD       | Minimum | Maximum |
|-------------------------|-------------------------------|-----------|----------|---------|---------|
| Age (years)             | Two hundred thirty-five       | 27.9      | 04.3     | 20      | 40      |
| Gestational age (weeks) | Two hundred thirty-five       | 08.6      | 02.6     | 04      | 15      |
| Parous                  | Two hundred thirty-five (71%) | 170 (71%) | 65 (29%) | 0       | 01      |

**Table No. 2: Fetal heartbeat and early pregnancy failure: a connection**

| Variables               | Total patients          | 01.FHF   | 02.No FHF | [03.p-value] |
|-------------------------|-------------------------|----------|-----------|--------------|
| Early pregnancy failure | Two hundred thirty-five | 43 (18%) | 84 (36%)  | < 0.06       |

**Table No. 3: Association between (CRL) and Early Pregnancy Failure**

| Variables               | Total patients          | Current  | After    | p-value |
|-------------------------|-------------------------|----------|----------|---------|
| Early pregnancy failure | Two hundred thirty-five | 44 (19%) | 81 (34%) | < 0.06  |

**Table No. 04: Gestational age and the failure of early pregnancies**

| Variables                      | Total patients          | (1 <sup>st</sup> )05-07 weeks | (2 <sup>nd</sup> )08-10 weeks | (3 <sup>rd</sup> )11-13 weeks | (03)14 weeks | p-value |
|--------------------------------|-------------------------|-------------------------------|-------------------------------|-------------------------------|--------------|---------|
| Failure of the pregnancy early | Two hundred thirty-five | 36 (15%)                      | 43 (19%)                      | 27 (12%)                      | 29 (12%)     | 0.54    |

**Table No. 05: Early Pregnancy Failure Odds Ratio**

| The Variables   | The Odds-Ratio (96% CI) | p-value |
|-----------------|-------------------------|---------|
| 1. F-Heart-beat | 03.07 (02.02-06.02)     | < 0.06  |
| 2.(CRL)         | 01.09 (01.01-03.03)     | < 0.06  |

**Table No. 6: Risk Factors for Early Pregnancy Failure**

| The Variables         | The risk | Odds Ratio (96% CI) | p-value |
|-----------------------|----------|---------------------|---------|
| mother's advanced age | [Yes]    | 01.05 (01.01-02.0)  | < 0.06  |
| The Smokers           | [Yes]    | 01.08 (01.02-02.07) | < 0.06  |
| The Alcohol user      | [Yes]    | 01.07 (01.01-02.06) | < 0.06  |

**Table No. 7: Model of Logistic Regression for Failure of Early Pregnancy**

| Variables               | OR (96% CI)         | p-value |
|-------------------------|---------------------|---------|
| 1.F-Heartbeat           | 03.07 (02.02-06.02) | < 0.06  |
| 2.(CRL)                 | 01.09 (1.1-3.3)     | < 0.06  |
| 3.Advanced maternal age | 01.05 (1.1-2.0)     | < 0.06  |
| 4.Smoking               | 01.08 (1.2-2.7)     | < 0.06  |
| 5. Alcohol use          | 01.07 (01.01-02.06) | < 0.06  |

**Table No. 8: Summery of Early Pregnancy Failure**

| Summery | Number | % |
|---------|--------|---|
|---------|--------|---|

|                       |     |       |
|-----------------------|-----|-------|
| Successful pregnancy  | 151 | (65%) |
| Miscarriage           | 52  | (23%) |
| Ectopic pregnancy     | 19  | (8%)  |
| Anembryonic gestation | 13  | (6%)  |

## DISCUSSION

According to a recent study, healthcare providers in Pakistan could use first-trimester ultrasound scans to predict early-trimester miscarriage.<sup>8</sup> The ability of the scan to locate the fetal heartbeat (FHB) and (CRL) has been shown to be critical in determining the likelihood of early pregnancy failure.<sup>9,10</sup> This is in line with earlier research since it is well known that FHB and (CRL) lower the chances of an early pregnancy. The higher risk of early pregnancy failure linked with FHB deficiency in this study, which is consistent with other research, further supported this inverse connection.<sup>11,12</sup> Early intervention to prevent or lower the frequency of premature failure may be impacted by early detection of high-risk pregnancy. This demonstrates how crucial it is to encourage the use of first trimester ultrasonography in the Pakistani healthcare system. A research conducted in Pakistan discovered that early pregnancy failure may be avoided by using ultrasound imaging. To forecast such situations, it is necessary to look for short CRLs and fetal heartbeats (FHBs). The frequency of early pregnancy failure may be decreased by promoting this strategy.<sup>13,14</sup>

## CONCLUSION

According to a research, first-trimester ultrasound images may be used to predict early pregnancy failure in Pakistan. CRL and fetal heart rate (FHB) are crucial markers of early pregnancy failure. When giving patients advice and determining how often to perform ultrasounds, doctors might use this early indication of pregnancy failure to their advantage.

### Author's Contribution:

Concept & Design of Study: Fauzia Afridi  
 Drafting: Kalsoom Nawab, Anwar ul Haq  
 Data Analysis: Hina Gul, Naheed Khan, Irsa Shoaib  
 Revisiting Critically: Fauzia Afridi, Kalsoom Nawab  
 Final Approval of version: Fauzia Afridi

**Conflict of Interest:** The study has no conflict of interest to declare by any author.

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