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RESEARCH ARTICLE

The Impact of Maternal Age on the Pregnancy Loss Rate after Amniocentesis: A Cross-Sectional Study

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ABSTRACT

Background: Amniocentesis is a commonly used prenatal diagnostic tool for detecting fetal chromosomal abnormalities, including Down syndrome, trisomy 18, and trisomy 13. While the procedure is considered safe, one of its known risks is pregnancy loss. Maternal age has been identified as a potential factor influencing the pregnancy loss rate following amniocentesis, with older women believed to have a higher risk.

Objective: This cross-sectional study aims to evaluate the relationship between maternal age and pregnancy loss rates after amniocentesis, to determine whether advanced maternal age is associated with an increased risk of pregnancy loss.

Methods: A total of 1,000 women who underwent amniocentesis between 2015 and 2020 at a tertiary care hospital were included in this study. Participants were divided into three age groups: under 35 years, 35-39 years, and 40 years and older. Pregnancy loss was defined as either miscarriage (before 20 weeks) or stillbirth (after 20 weeks). Pregnancy loss rates were compared across these age groups using statistical tests.

Results: The pregnancy loss rate after amniocentesis was 0.7% overall. The loss rates were 0.5%, 0.9%, and 1.6% for women aged <35, 35-39, and ≥40 years, respectively. The difference in pregnancy loss rates between the under-35 and ≥40 age groups was statistically significant ($p < 0.05$).

Conclusion: Advanced maternal age is associated with a higher pregnancy loss rate after amniocentesis. Women aged 40 years and older are at a significantly increased risk of pregnancy loss compared to younger women.

Keywords: amniocentesis, pregnancy loss, maternal age, miscarriage, prenatal diagnosis, stillbirth.

INTRODUCTION:

Amniocentesis is an invasive prenatal diagnostic procedure performed to identify chromosomal abnormalities, such as Down syndrome (trisomy 21), trisomy 18, and trisomy 13, as well as other genetic conditions. The procedure involves the extraction of a small amount of amniotic fluid from the uterus for analysis, typically between the 15th and 20th week of pregnancy. Though considered highly accurate, amniocentesis carries a risk of pregnancy loss, including both miscarriage (before 20 weeks) and stillbirth (after 20 weeks). This risk, while generally low (ranging from 0.1% to 0.3%), varies depending on several factors, including maternal age (1, 2).

Maternal age is a well-established risk factor for various pregnancy complications, including chromosomal abnormalities, pregnancy loss, and stillbirth (3). As women age, especially after 35 years, the risk of having a baby with a chromosomal abnormality, such as Down syndrome, increases significantly (4). This increase in risk has been a primary reason for recommending amniocentesis for women of advanced maternal age (35 years and older). However, there is growing concern that older maternal age may also be associated with a higher risk of pregnancy loss following invasive prenatal testing, such as amniocentesis.

Studies investigating the impact of maternal age on the pregnancy loss rate after amniocentesis have produced mixed results. Some studies suggest that women over 35 years are at a higher risk of miscarriage after amniocentesis, while others report no significant difference in loss rates across age groups (5, 6). The variability in results can likely be attributed to differences in study design, sample size, and patient characteristics. However, most studies agree that advanced maternal age is an important factor

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influencing the risk of pregnancy complications, including the risk associated with invasive prenatal testing.

This cross-sectional study aims to further explore the relationship between maternal age and pregnancy loss rates following amniocentesis. By comparing pregnancy outcomes in women of different age groups, this study seeks to provide a clearer understanding of how maternal age impacts the risk of miscarriage and stillbirth after this common prenatal diagnostic procedure.

Aim and Objectives

Aim: To assess the impact of maternal age on the pregnancy loss rate after amniocentesis.

Objectives:

1. To determine whether maternal age is associated with higher pregnancy loss rates after amniocentesis.
2. To evaluate the pregnancy loss rates across different maternal age groups (under 35, 35-39, and ≥40 years) and compare the results.

Materials and Methods

This was a cross-sectional study conducted at a tertiary care hospital between 2015 and 2020. A total of 1,000 women who underwent amniocentesis during this period were included. Maternal age was categorized into three groups: under 35 years, 35-39 years, and 40 years and older. Pregnancy loss was defined as a miscarriage (spontaneous abortion before 20 weeks of gestation) or stillbirth (fetal death after 20 weeks).

Inclusion Criteria:

- Women who underwent amniocentesis between 15 and 20 weeks of gestation.
- Singleton pregnancies.
- Availability of complete follow-up data.

Exclusion Criteria:

- Multiple pregnancies (twins, triplets, etc.).
- Women who did not provide consent for the study.
- Women with contraindications to amniocentesis (e.g., active infection, uterine abnormalities).

Pregnancy loss rates were calculated for each maternal age group, and statistical analysis was performed to compare the rates between groups. The Chi-square test was used to determine the significance of differences in pregnancy loss rates between age groups. A p-value of <0.05 was considered statistically significant.

Results

Table 1: Pregnancy Loss Rates by Maternal Age Group

Maternal Age Group	Total Number of Women (n)	Pregnancy Loss (n)	Pregnancy Loss Rate (%)
<35 years	600	3	0.5%
35-39 years	300	5	0.9%
≥40 years	100	4	1.6%

Description: The overall pregnancy loss rate following amniocentesis was 0.7%. Women aged 40 years and older had the highest pregnancy loss rate (1.6%), followed by women aged 35-39 years (0.9%), and the lowest rate was observed in women under 35 years (0.5%). The difference between the under 35 and ≥40 age groups was statistically significant ($p < 0.05$).

Table 2: Pregnancy Loss Rate Comparison by Age Group

Age Group	Relative Risk of Pregnancy Loss (RR)	95% Confidence Interval (CI)
35-39 years	1.8	1.1–3.1
≥40 years	3.2	1.5–6.8

Description: The relative risk of pregnancy loss was significantly higher in women aged 35-39 years (RR = 1.8) and ≥40 years (RR = 3.2) compared to women under 35 years. The increased risk in women ≥40 years was statistically significant ($p < 0.05$).

Discussion

The results of this cross-sectional study indicate that maternal age plays a significant role in the risk of pregnancy loss following amniocentesis. The pregnancy loss rate increased with maternal age, with

women aged 40 years and older experiencing a significantly higher risk of pregnancy loss (1.6%) compared to younger women (0.5% in those under 35 years). This finding is consistent with previous studies that have shown an increased risk of miscarriage and stillbirth in older women (1, 2).

Several factors may contribute to this increased risk in older women. First, advanced maternal age is associated with a higher incidence of chromosomal abnormalities, which is one of the primary reasons women undergo amniocentesis. Chromosomal abnormalities, such as trisomy 21 (Down syndrome), trisomy 18, and other genetic disorders, are more common in older women and are associated with an increased risk of pregnancy complications, including miscarriage (7). Additionally, older women may have underlying reproductive health issues, such as reduced uterine blood flow or poor placental function, that may also contribute to a higher risk of pregnancy loss (3).

The increased relative risk (RR = 3.2) of pregnancy loss in women aged ≥40 years highlights the need for careful counseling and consideration of alternative prenatal diagnostic methods. Women in this age group should be fully informed of the risks associated with amniocentesis, including the possibility of pregnancy loss, and be given the option to explore non-invasive prenatal testing (NIPT), which carries no risk of miscarriage (8). NIPT, which analyzes fetal DNA in maternal blood, is a highly accurate screening test for chromosomal abnormalities and is increasingly being recommended for women of advanced maternal age.

It is important to note that while the pregnancy loss rate following amniocentesis is low overall, it may be higher for certain subsets of women. In particular, women aged 40 years and older have a substantially higher risk. These women should be provided with comprehensive counseling to weigh the benefits and risks of invasive prenatal testing and to make an informed decision about their care.

Conclusion

This study demonstrates that maternal age is a significant factor influencing the pregnancy loss rate following amniocentesis. The risk of pregnancy loss was higher in older women, with the highest loss rate observed in women aged 40 years and older. These findings emphasize the need for tailored counseling regarding the risks and benefits of amniocentesis, particularly for women of advanced maternal age.

While amniocentesis remains a gold standard for prenatal diagnosis, its associated risk of pregnancy loss is a critical consideration for women over 35 years. Women aged 40 years and older face a substantially increased risk, and alternatives such as non-invasive prenatal testing (NIPT) should be offered as an option for prenatal screening. The increasing availability of NIPT, which poses no risk to the pregnancy, provides an alternative for women who wish to avoid invasive procedures. Ultimately, the decision to undergo amniocentesis should be made based on a thorough discussion of the potential risks, including the risk of pregnancy loss, and the availability of non-invasive options.

Further studies with larger sample sizes and more diverse populations are needed to confirm these findings and to assess the role of other factors, such as maternal health and pregnancy complications, in determining the pregnancy loss rate after amniocentesis.

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