International Journal of Reproduction, Contraception, Obstetrics and Gynecology
Saminathan T et al. Int J Reprod Contracept Obstet Gynecol. 2026 Jun;15(6):xxx-xxx
www.ijrcog.org
pISSN 2320-1770 | eISSN 2320-1789

DOI: https://dx.doi.org/10.18203/2320-1770.ijrcog20261464

Original Research Article

Incidence and etiological profile of second trimester abortion: a prospective observational study

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Received: 04 April 2026
Revised: 01 May 2026
Accepted: 02 May 2026

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ABSTRACT

Background: Second trimester abortion, occurring between 14 and 24 weeks of gestation, is associated with higher maternal morbidity compared to first trimester termination. Despite its relatively lower incidence, it contributes disproportionately to abortion-related complications. Understanding the incidence and etiological factors is essential for improving preventive and clinical strategies. The aim was to determine the incidence and most common causes of second trimester abortion in a tertiary care center.

Methods: This prospective observational study was conducted in the Department of Obstetrics and Gynaecology at Government Raja Mirasudhar Hospital, Thanjavur Medical College, over a period of one year. A total of 315 women with second trimester abortion (14–24 weeks gestation) were included. Data regarding sociodemographic characteristics, obstetric profile, type of abortion (spontaneous or induced), and etiological factors were collected and analyzed. Descriptive statistics were used, and results were expressed as mean±standard deviation, frequencies, and percentages. Appropriate statistical tests were applied, with $p<0.05$ considered significant.

Results: The mean age of participants was 24.21±5.13 years. Induced abortions constituted 82.5% of cases, while spontaneous abortions accounted for 17.5%. The majority of abortions occurred between 17–19 weeks of gestation (45.7%). Among spontaneous abortions, unexplained causes were most common (52%), followed by cervical incompetence (13%) and uterine anomalies (11%). A statistically significant association was observed between age and type of abortion ($p<0.05$).

Conclusion: Second trimester abortion is predominantly induced, reflecting increasing reliance on medical termination for late-detected pregnancies and fetal anomalies. Among spontaneous abortions, a significant proportion remains unexplained, highlighting the need for improved diagnostic evaluation. Early identification of preventable causes such as cervical incompetence and enhanced antenatal care was essential to reduce maternal morbidity.

Keywords: Second trimester abortion, Induced abortion, Spontaneous abortion, Cervical incompetence, Uterine anomalies, Incidence

INTRODUCTION

Abortion is defined as the expulsion or extraction of a fetus from the uterus before it attains viability, conventionally corresponding to a fetal weight of less than 500 grams or a gestational age below 20–24 weeks, depending on regional definitions.[1] Second trimester abortion, typically occurring between 14 and 24 weeks of gestation, represents a clinically significant subset due to its comparatively higher association with maternal morbidity and mortality when contrasted with first trimester termination.[2]

Globally, second trimester abortions constitute a smaller proportion of total abortions; however, they disproportionately contribute to abortion-related

complications, including hemorrhage, infection, uterine injury, and increased need for surgical intervention. In low- and middle-income countries, these risks are further amplified by delayed access to healthcare, limited availability of safe abortion services, and sociocultural barriers influencing timely decision-making.[3]

In the Indian context, despite the legalization of medical termination of pregnancy under the Medical Termination of Pregnancy Act, second trimester abortions remain prevalent.[4] This is largely attributable to factors such as late recognition of pregnancy, contraceptive failure, limited awareness, and the increasing use of advanced antenatal diagnostic modalities enabling detection of fetal anomalies at a later gestational age.[5] Consequently, a substantial proportion of women present during the second trimester seeking termination, often under medically or socially indicated circumstances.[6]

Second trimester abortions may be classified as spontaneous or induced. Spontaneous abortions during this period are frequently associated with identifiable etiologies such as chromosomal abnormalities, uterine structural defects, cervical incompetence, placental insufficiency, infections, and maternal systemic disorders including autoimmune and thrombotic conditions.[7] Conversely, induced abortions are commonly performed for therapeutic, eugenic, humanitarian, or social indications. Understanding the relative contribution of these factors is essential for developing targeted preventive strategies.[8]

Despite advancements in diagnostic and therapeutic modalities, a significant proportion of second trimester pregnancy losses remain unexplained, underscoring gaps in current clinical evaluation and the need for comprehensive etiological assessment.[9] Furthermore, the epidemiological profile of second trimester abortion varies across regions and healthcare settings, necessitating institution-specific data to inform clinical practice and public health policies.[10]

In this context, the present study was undertaken to determine the incidence and analyze the etiological factors associated with second trimester abortion in a tertiary care center. The study aims to contribute to improved clinical management and reduction of maternal morbidity associated with second trimester pregnancy loss by elucidating the predominant causes and patterns.

Aim

The aim of the study was to determine the incidence and most common causes of second trimester abortion in a tertiary care center.

Objectives

Objectives of the study were to estimate the incidence of second trimester abortion among admitted obstetric cases, to identify the distribution of spontaneous and induced abortions and to analyze the etiological factors contributing to spontaneous second trimester abortion.

METHODS

Study design and setting

This study was designed as a prospective observational study conducted in the Department of Obstetrics and Gynaecology at Government Raja Mirasudhar Hospital, Thanjavur Medical College, a tertiary care referral center in South India. The study was carried out over a period of one year.

Study population

The study population comprised all pregnant women admitted with second trimester abortion between 14 and 24 weeks of gestation during the study period. A total of 315 participants fulfilling the eligibility criteria were included in the study.

Study period

The study was conducted from May 2021 to May 2022.

Inclusion criteria

Pregnant women with a gestational age between 14 and 24 weeks were included in the study. The study population comprised patients presenting with spontaneous abortion as well as those undergoing induced abortion for medical, eugenic, humanitarian, or social indications. These criteria ensured the inclusion of clinically relevant cases within the defined gestational period.

Exclusion criteria

Patients diagnosed with septic abortion were excluded from the study. Additionally, individuals who had consumed medical termination pills independently and presented with subsequent complications were not considered. Patients unwilling to participate were also excluded to maintain ethical standards and ensure informed consent.

Sampling method

A consecutive sampling technique was employed, wherein all eligible patients admitted during the study period were included until the desired sample size was achieved. This approach ensured representation of the entire spectrum of second trimester abortion cases encountered in the institution.

Data collection procedure

Upon admission, eligible patients were enrolled after obtaining informed written consent. A structured proforma

was used to systematically record the following details like sociodemographic data: age, marital status, and socioeconomic status, obstetric history: gravidity, parity, previous abortions, and antenatal history, clinical evaluation: general physical examination and obstetric examination and investigations included ultrasonography for confirmation of gestational age, fetal viability, and anomalies and routine laboratory investigations including hemoglobin estimation, blood grouping, and urine analysis

For patients with spontaneous abortion, efforts were made to identify underlying etiological factors through clinical assessment and relevant investigations. Causes such as cervical incompetence, uterine anomalies, antiphospholipid antibody syndrome, and infections were documented where identifiable. For induced abortions, the indication for termination was recorded and classified accordingly.

Outcome measures

The primary outcomes assessed in relation to the first aim included incidence of second trimester abortion among admitted obstetric cases, distribution of abortion type: spontaneous versus induced and etiological profile of spontaneous abortion, including identifiable and unexplained causes

Operational definitions

Second trimester abortion designed as pregnancy loss occurring between 14 and 24 weeks of gestation.[11]

Spontaneous abortion defined as pregnancy loss without medical or surgical intervention.[12]

Induced abortion defined as termination of pregnancy carried out intentionally under medical supervision.[13]

Statistical analysis

Data were entered into Microsoft Excel and analyzed using appropriate statistical software. Descriptive statistics were employed to summarize the data: continuous variables were expressed as mean±standard deviation (SD) and categorical variables were expressed as frequencies and percentages.

Comparative analysis between groups (where applicable) was performed using: Chi-square test for categorical variables and independent sample t-test for continuous variables.

A $p<0.05$ was considered statistically significant.

Ethical considerations

Institutional ethical committee approval was obtained prior to the commencement of the study. Informed written consent was obtained from all participants. Confidentiality of patient data was strictly maintained throughout the study, and all procedures adhered to standard ethical guidelines for biomedical research.

Overview of study population

A total of 315 women with second trimester abortion (14–24 weeks gestation) were included in the study. The analysis encompassed sociodemographic characteristics, obstetric profile, incidence of abortion types, and etiological factors associated with spontaneous abortion.

RESULTS

Sociodemographic characteristics

The majority of participants belonged to the 20–24 years age group (33.3%), followed by <19 years (23.2%). This indicates that second trimester abortions were more frequent among younger reproductive age groups (Table 1). Mean age±SD was 24.21±5.13 years.

A predominant proportion of participants were married (77.1%). Most belonged to lower socioeconomic strata (class III and IV), suggesting a possible association between socioeconomic status and second trimester abortion (Table 2).

Table 1: Age distribution of study participants (n=315).

Age group (years)	Number	Percentage
<19	73	23.2
20–24	105	33.3
25–29	70	22.2
30–34	67	21.3

Table 2: Marital status and socioeconomic status.

Variable	Category	Number	Percentage
Marital status	Married	243	77.1
	Unmarried	72	22.9
Socioeconomic class	Class III	194	61.6
	Class IV	121	38.4

Obstetric profile

Primigravida women constituted the largest group (34.9%), followed by gravida 3 (31.1%), indicating that second trimester abortion occurs across all parity groups without a marked predominance (Table 3).

Table 3: Parity distribution.

Parity status	Number	Percentage
Primi	110	34.9
Gravida 2	65	20.6
Gravida 3	98	31.1
≥Gravida 4	42	13.4

Most abortions occurred between 17–19 weeks (45.7%), indicating that mid-second trimester is the most vulnerable period for pregnancy termination (Table 4).

Table 4: Gestational age distribution.

Gestational age (weeks)	Number	Percentage
14–16	81	25.7
17–19	144	45.7
>19–20	70	22.3
>20–24	20	6.3

Induced abortions constituted the majority (82.5%), while spontaneous abortions accounted for 17.5%. This reflects a significant contribution of medically indicated or elective terminations to the overall incidence (Table 5).

Incidence and type of second trimester abortion

Association between age and type of abortion

The mean age was significantly higher in the induced abortion group compared to the spontaneous group. Spontaneous abortions were predominantly observed in the 20–24 years age group (83.6%), indicating a statistically significant association between age and type of abortion (Table 6). Mean age±SD induced was 24.55±5.43 years and spontaneous was 22.62±2.86 years and $p<0.05$.

Table 5: Distribution of abortion type.

Type of abortion	Number	Percentage
Spontaneous	55	17.5
Induced	260	82.5
Total	315	100

Table 6: Age distribution by type of abortion.

Age group	Induced, N (%)	Spontaneous, N (%)
<19	72 (27.7)	1 (1.8)
20–24	59 (22.7)	46 (83.6)
25–29	65 (25.0)	5 (9.1)
30–34	64 (24.6)	3 (5.5)

Etiological distribution of spontaneous abortion

Unexplained causes were the most frequent (52%), followed by cervical incompetence (13%) and uterine anomalies (11%). Identifiable pathological conditions such as antiphospholipid syndrome contributed to a smaller proportion (Table 7).

Key findings

The incidence of second trimester abortion was predominantly induced (82.5%). The mean age of participants was 24.21±5.13 years, with most cases occurring in the 20–24 years age group. The majority of women belonged to lower socioeconomic classes, indicating a possible social determinant influence. Mid-second trimester (17–19 weeks) was the most common period for abortion. Unexplained etiology (52%) was the leading cause of spontaneous abortion. Cervical incompetence and uterine anomalies were the most common identifiable causes. A statistically significant association was observed between age and type of abortion ($p<0.05$).

Table 7: Causes of spontaneous abortion (n=55).

Cause	Number	Percentage
Unexplained	29	52
Cervical incompetence	7	13
Anomalous uterus	6	11
Antiphospholipid syndrome	4	7
Others	9	17

DISCUSSION

The present prospective observational study evaluated the incidence and etiological profile of second trimester abortion in a tertiary care setting. The findings demonstrate that induced abortions constituted the majority (82.5%), while spontaneous abortions accounted for 17.5%. Additionally, unexplained causes were the predominant etiology among spontaneous abortions, followed by cervical incompetence and uterine anomalies.

Incidence and pattern of second trimester abortion

In the present study, induced abortions formed a substantial proportion (82.5%) of second trimester abortions. This observation is consistent with existing literature, which reports that although second trimester abortions constitute only 10–15% of total abortions, they account for a disproportionately higher rate of complications. The high proportion of induced abortions in this study can be attributed to late diagnosis of pregnancy, contraceptive failure, and increasing use of antenatal screening modalities for detection of fetal anomalies.

Studies by Patel et al in 2013 and Kapp et al in 2013 have similarly highlighted the growing trend of medically indicated second trimester terminations, particularly due to improved prenatal diagnostic capabilities.[14,15] The predominance of induced abortions in the present study aligns with these observations and underscores the evolving clinical landscape of mid-trimester pregnancy termination.

Age distribution

The mean age of participants in the present study was 24.21±5.13 years, with the majority belonging to the 20–24 years age group. This finding is consistent with

demographic trends reported in previous studies, where the peak reproductive age group contributes the highest proportion of abortion cases.

Notably, spontaneous abortions in the present study were more common in younger women (mean age 22.62±2.86 years), whereas induced abortions occurred in relatively older women (mean age 24.55±5.43 years), with a statistically significant difference ($p<0.05$). This observation suggests that induced abortions may be influenced by social and reproductive planning factors, whereas spontaneous abortions may be more closely related to biological and physiological determinants.

Gestational age distribution

The majority of abortions in this study occurred between 17–19 weeks of gestation (45.7%). This finding is in agreement with previous literature, which indicates that many second trimester terminations occur during the mid-trimester period due to delayed diagnosis of fetal anomalies or late presentation of patients.

Studies evaluating second trimester abortion patterns have consistently reported clustering around 16–20 weeks, particularly in cases where anomaly scans or diagnostic procedures such as amniocentesis are performed. Thus, the gestational age distribution observed in the present study corroborates established clinical patterns.

Etiology of spontaneous abortion

A key finding of the present study is that unexplained causes accounted for 52% of spontaneous abortions. This is consistent with earlier studies reporting that a significant proportion of second trimester losses remain idiopathic despite thorough evaluation. The persistence of unexplained cases highlights the limitations of routine diagnostic modalities and the potential role of unrecognized genetic, immunological, or thrombophilic factors.

Cervical incompetence

Cervical incompetence accounted for 13% of spontaneous abortions in the present study. This finding is comparable with earlier studies that identify cervical insufficiency as a major preventable cause of second trimester pregnancy loss. Literature suggests that cervical incompetence contributes to approximately 10–15% of mid-trimester losses, which closely parallels the findings of the current study. The clinical importance of this condition lies in its amenability to intervention through cervical cerclage.

Uterine anomalies

Uterine anomalies were responsible for 11% of cases in this study. Previous studies have reported that congenital uterine malformations contribute to 10–15% of recurrent pregnancy losses. The present findings are consistent with these reports and reinforce the role of structural abnormalities in impaired implantation and placentation.

Antiphospholipid antibody syndrome

Antiphospholipid antibody syndrome (APS) accounted for 7% of spontaneous abortions in the present study. This is in agreement with meta-analyses indicating a significant association between thrombophilic disorders and second trimester pregnancy loss. Studies such as those by Forastiero et al in 2005 and others have demonstrated that antiphospholipid antibodies are strongly linked to placental thrombosis and adverse pregnancy outcomes.[16] The relatively lower proportion observed in this study may reflect underdiagnosis or limited screening.

Infections

Although a smaller proportion, infections have been reported in literature to contribute to 10–25% of second trimester losses. The present study findings are broadly consistent with this range, although infections were less prominently identified, possibly due to diagnostic limitations.

Comparison with pharmacological and induction studies

Although the primary aim of the present analysis focuses on incidence and etiology, it is relevant to contextualize findings within the broader literature on second trimester abortion practices. Studies by Bebbington in 2002 and Tang et al in 2004 demonstrated variations in induction-abortion intervals based on the route of misoprostol administration, while Mukherjee in 2019 and Nautiyal in 2015 emphasized the efficacy of sublingual and vaginal routes.[17-20]

Furthermore, Iyyar in 2013 and Dickinson et al in 2010 established that the combination of mifepristone and misoprostol significantly reduces induction-abortion interval and improves success rates compared to misoprostol alone.[21,22] These studies indirectly support the high proportion of induced abortions observed in the present study, reflecting the widespread adoption of medical methods.

CONCLUSION

The present study demonstrates that second trimester abortion is predominantly induced, accounting for the majority of cases, thereby reflecting the increasing role of medical termination in response to unplanned pregnancies and late detection of fetal anomalies. Spontaneous abortions constituted a smaller proportion; however, they remain clinically significant due to their association with identifiable pathological conditions.

Among spontaneous abortions, unexplained etiology emerged as the most frequent cause, indicating substantial gaps in current diagnostic capabilities. Cervical incompetence and uterine anomalies were the most

common identifiable contributors, both of which are potentially amenable to early detection and intervention. The findings further emphasize that the peak occurrence of second trimester abortion lies within the mid-trimester period and predominantly affects women in the younger reproductive age group.

These observations underscore the need for strengthening early antenatal care, improving access to contraceptive services, and implementing timely screening for high-risk conditions such as cervical insufficiency and thrombophilic disorders. Additionally, enhancing diagnostic evaluation for unexplained cases is essential to reduce recurrence and associated maternal morbidity.

Targeted preventive strategies, early risk identification, and improved clinical management protocols are critical to reducing the burden and complications associated with second trimester abortion.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Saminathan T, Nisha SAB. Incidence and etiological profile of second trimester abortion: a prospective observational study. Int J Reprod Contracept Obstet Gynecol 2026;15:xxx-xx.