SYSTEMATIC REVIEW ON PREGNANCY OUTCOME FOLLOWING SPONTANEOUS ABORTIONS

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ABSTRACT:

Background: Spontaneous abortion (SAB) or miscarriage, is a common complication in early pregnancy, affecting approximately 10-20% of recognized pregnancies. Women with this history may face an increased risk of adverse outcomes in subsequent pregnancies. This study aims to evaluate pregnancy outcomes in women with a history of spontaneous abortion and identify factors influencing these outcomes.

Methodology: This systematic review followed the PRISMA guidelines, incorporating an extensive search across major electronic databases. It includes various study types, consisting of analytical studies and full-text literature. The review specifically includes studies that provide information on the history of SAB and maternal and fetal outcomes. The risk of bias was assessed using established methodologies.

Results: A total of 10 studies were included, with the mean age of women ranged between 26 to 28 years. The majority of studies (61.67%) were categorized as low risk, indicating their reliability, while 20.00% were classified as unclear, showing some ambiguity but not invalidating the results. Studies supposed high risk (18.33%) indicated significant bias and potential errors. The findings suggest that women with a history of SAB had a higher incidence of preterm birth, cesarean section, low birth weight, gestational diabetes mellitus (GDM), intrauterine growth retardation (IUGR), placental abnormalities, and hypertensive disorders.

Conclusion: Most of the study results identified a history of abortion as a significant risk factor for adverse pregnancy outcomes, including increased rates of pregnancy complications and maternal morbidity. Findings highlight the importance of careful monitoring and management in subsequent

pregnancies for women with this history to improve both maternal and fetal outcomes. Further research is necessary to clarify the underlying mechanisms and to enhance care strategies for this population.

Keywords: *Spontaneous abortions, Maternal health, fetal health, complication,adverse effects, outcomes,*

INTRODUCTION

Abortion is a term used to define the pregnancy that fails to progress, resulting in the death and expulsion of the embryo or fetus. [1] SAB referred to as miscarriage, and is defined as the loss of pregnancy before 20 weeks of gestation. [2] Studies have indicated that SAB occur in 11% to 20% of pregnancies. [3] In India, the prevalence of SAB is higher in urban areas compared to rural areas. [4] Most SAB occur in the early weeks of pregnancy and may be confused with menstrual bleeding. The rate of spontaneous and unwanted abortions is difficult to determine, especially in countries where legal abortion is prohibited, leading to potential underreporting.

The causes of SAB are multifactorial, with genetic abnormalities being the most common etiology. Chromosomal abnormalities, particularly aneuploidy, are responsible for up to 50-70% of SAB, especially in early pregnancy. [1,5] Other risk factors include advanced maternal age, uterine abnormalities, single autosomal trisomy, uterine morphologic pathologies, endocrine diseases, thrombophilia, infectious agents, and autoimmune disorders. Lifestyle factors, such as smoking, excessive alcohol consumption, and obesity, have also been associated with an increased risk of SAB.[6-8]

Women who experience SAB are at a higher risk of adverse outcomes in subsequent pregnancies. Common complications include low birth weight, small for gestational age, growth retardation, and preterm labor. These outcomes may be associated with factors such as immunological issues, a low PGI2/thromboxane ratio in recurrent abortion, and microthrombosis in the placenta. [9-10]

Furthermore, women with a history of recurrent SAB abortion also face an increased risk of developing non-communicable diseases, including hypertension, cardiovascular diseases, and type 2 diabetes. [6, 11]

The current study aims to examine the outcomes of pregnancy following SAB, focusing on factors that may influence subsequent pregnancy success or failure. By identifying key predictors of pregnancy outcomes after a spontaneous abortion, this research seeks to provide valuable insights that can guide clinical practice and support women in achieving healthy pregnancies after a loss. Understanding these factors is essential for improving reproductive health outcomes and offering better care to women who have experienced spontaneous abortion.

METHODOLOGY

The protocol for this systematic review was developed in accordance with the PRISMA-P (Preferred Reporting Items for Systematic Reviews and Meta-Analyses Protocols) guidelines, and all modifications have been documented. The Cochrane Handbook for Systematic Reviews of Interventions and the PRISMA statement guided the methodology and reporting of this review.

Search Strategy:

A comprehensive literature search was conducted across multiple databases, including PubMed, Scopus, Google Scholar, and others. The search strategy employed a combination of keywords such as "spontaneous abortion," "miscarriage," "risk factors," and "pregnancy outcomes." This search was limited to studies published in the English language.

Study Selection

The selection of studies involved a rigorous process based on predefined inclusion and exclusion criteria:

Inclusion Criteria:
- Articles published in the English language.
- Studies that focus on women with a history of recurrent spontaneous abortions.
- Articles provided details about pregnancy outcomes following spontaneous abortions.
- Articles providing associated risk factors for recurrent pregnancy loss.

Exclusion Criteria:
- Articles published before
- Studies that is incomplete, such as those lacking essential data or methodology.
- Duplicates and non-original articles (e.g., reviews, editorials, or opinion pieces).
- Patients with concurrent illnesses that may confound pregnancy outcomes.

Data extraction:

The data from the articles was input into an Excel spread sheet and duplicates were removed after extraction from the databases. The abstracts of each article were then independently evaluated, and papers were selected according to the established criteria. The final choice of pertinent studies was made by carefully reviewing the full content of the selected publications. The Data extraction was performed independently by two reviewers using a standardized form, capturing key variables such as study design, sample size, patient demographics, outcome measures, and identified risk factors.

Quality assessment of included study:

Using RevMan software version 5.4, the piloted extraction of information was carried out in Microsoft Office Excel 2013 (Microsoft Corporation, USA). The risk of bias in the research was independently measured by two review writers. The listed trials were evaluated by the Risk of Bias Tool for Randomised Controlled Trials. Researches were given the risk categories of high (+), ambiguous (?) or low (-). The following areas were examined: the creation of random sequences, hiding of allocations, blinding of result assessors, insufficient outcome data, and other bias-inducing factors. The Cochrane checklist for reporting and assessing result reported by patients in clinical trials was used as a reference to estimate the quality of the research included in the analysis.

RESULTS:

In this systematic review, the primary search resulted in 1062 articles. 490 articles were excluded because of duplication. After analyzing 572 available databases, 88 articles were excluded because of some missing parameters in articles. The articles which are incomplete and irrelevant with present study were also excluded. 56 full articles were assessed for the study. Non-published works have also been excluded from the present review. Following a comprehensive examination of all available data, a total of 10 research met the inclusion criteria and were selected. (**Fig:1**)
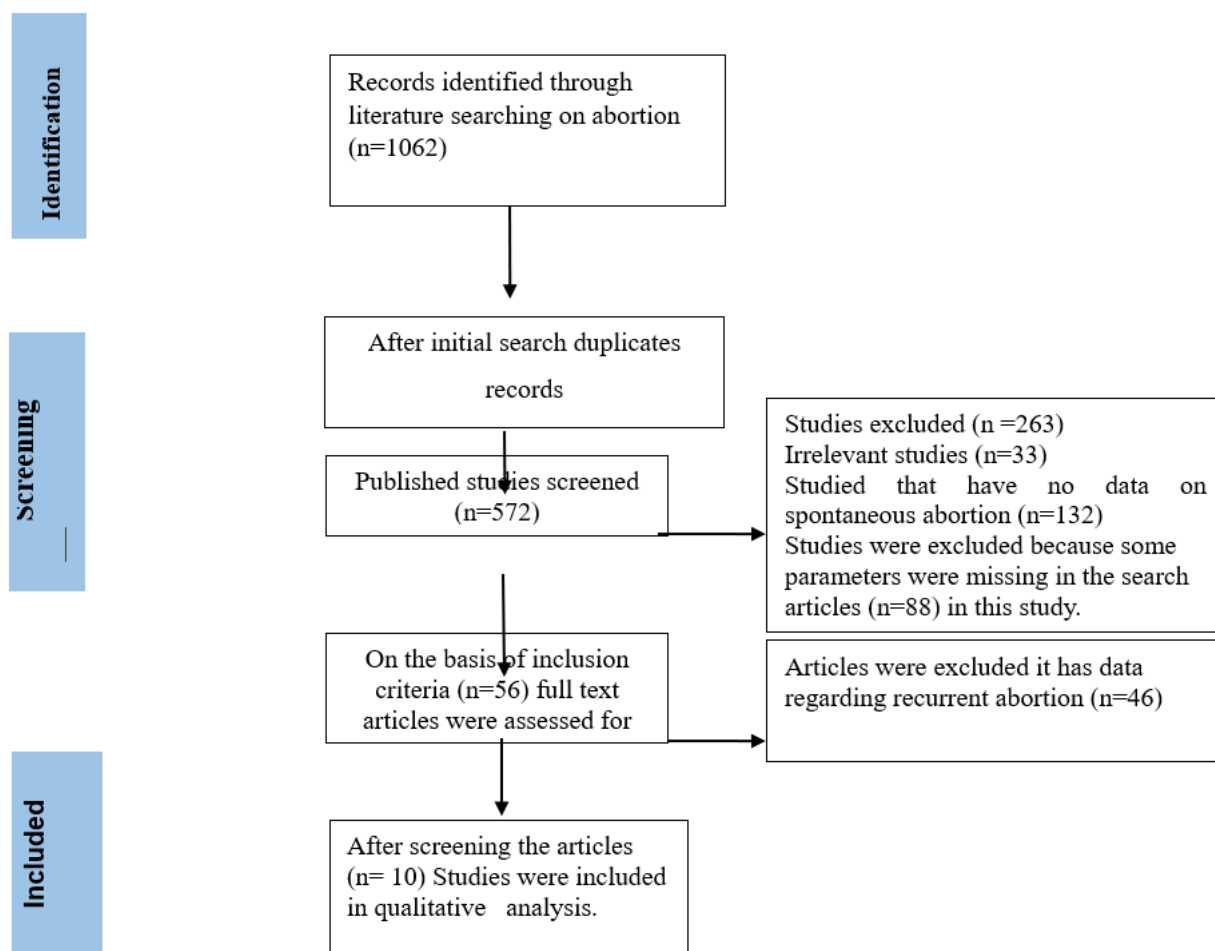
Fig 1: A flowchart illustrates a systematic review that involved databases and registered searches. (PRISMA)

Study characteristics:
In the systematic review, most of the included articles were prospective studies (n=6) [1,5,9,12,14], with one randomized controlled trial (n=1) [18] and one case-control study (n=1) [15]. The mean age of the pregnant women ranged between 26 and 28 years. The findings from the majority of studies indicated that a history of abortion was linked to an increased likelihood of caesarean sections. Additionally, a history of SAB was associated with caesarean sections, preterm birth, intrauterine growth restriction (IUGR), fetal distress, and neonatal intensive care unit (NICU) admission. However, there was no consistent association between a history of SAB and gestational hypertension, small-for-gestational-age infants, preeclampsia, or placenta previa

Table 1: Characteristic of studies

Sr. No	Author	Year	Study design	Sample size	Mean age	Mode of delivery	Maternal outcomes	Fetal outcomes
1.	Vijayalakshmi et al., [12]	2023	Prospective observational study	150	26.18± 4.12	Normal-92(66%), LSCS-50(34%)	preterm delivery-29%,6% had SAB	Cephalic position-60%, Breech presentation-19%, LBW-25%, FD-15%, FGR-9%, IUD-1%

2.	Sun H et al., [13]	2023	Retrospective study	10,992	-	LSCS-38.62%	Premature delivery-0.76%, GDM-15%, PHD-5.41%, Placenta abnormality-8.04%, Placenta Previa-5.43%	-
3.	Singh P et al., [1]	2023	prospective observational comparative study	92 SAB	28.87±3.33		GDM -12 (13.04%).IUGR- 2 (2.17%), obstetric cholestatis,2 (2.17%), Beta thalassemia 4 (4.35%)	-
4.	Rajurkar K, et al.,[14]	2023	prospective study	300	28.15 ± 3.66	Vaginal delivery-60.3%, LSCS-39.7	Term-53.67%,**PROM-**23.7%,preterm-12%,abortion-7.3%,IUGR-2%, post-term-1.3%	Live birth-92.4%,aboration-7.3%, stillbirth-0.3%
5.	Jayakumar et al.,[15]	2022	Case control observational study	200(100 cases, 100-control)	28.71	LSCS- 18	Recurrence of abortion-16%, PROM-36%, Preeclampsia-2%	Low birth weight- 17
6.	Basu R, et al., [16]	2022	prospective observational study	100	-	NVD-31(33.33%),LSCS-61(65.59)	Abortion-6%, IUFD-1%, PROM-7%	Preterm live-16%, term live birth-77%
7.	Muzaffar et al., [17]	2020	-	140	-	NVD-50%, LSCS-50%	Preterm delivery-14.2%, PROM-9.25%, IUGR-7.1%,	-
8.	Nehal N and Sawant V [9]	2019	Prospective observational study	100(50-cases, 50-control)	24.4	NVD-23 LSCS-27	PROM, Preterm delivery, IUGR	Fetal distress

9.	Agrawal S, et al.,[5]	2015	Prospective study	70	-	Vaginal delivery-42(70%), 14(23.3%)	Preterm delivery-6(8.6%),	Still birth-2(2.9%), Term live birth-51(72.86%)
10.	Michal et al., [18]	2014	Randomized trial	Total 9969; SAB-1240	24.5 ± 5.5		Spontaneous preterm birth-83, Preterm PROM-36, Pre-eclampsia-83,	Fetal/Neonatal death-47, Birthweight < 5th percentile-65,NICU-137

Foot Note: **NVD**: Normal Vaginal Delivery, **LSCS**: Lower Segment Cesarean Section, **PROM**: Premature Rupture of Membranes, **IUGR**: Intrauterine Growth Restriction, **GDM**: Gestational Diabetes Mellitus**, FGR**: Fetal Growth Restriction, **LBW**: Low Birth Weight, **FD**: Fetal Distress

Figure 2: The author's assessment of each risk of bias factor is depicted as percentages in the risk of bias chart.
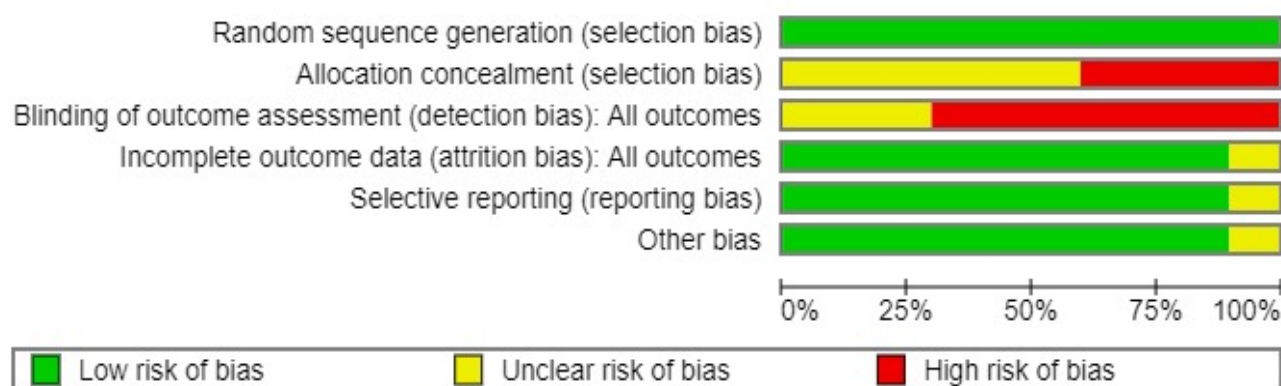

Figure 3: The author's evaluation of each bias risk factor

Most articles received a low-risk grade (61.67%) based on overall bias evaluation.[1,5,9,12,13,14,15,16,17,18] A "low-risk" rating indicates that these studies used reliable methods to categorize patients into different treatment groups, ensuring the validity of their results. Some studies were rated as "unclear (20.00%) "[1,5,12,13,14,15,17,18], suggesting potential bias, but not significant enough to invalidate their findings, possibly due to missing data. **Figure 2** illustrates that a "high-risk" study (18.33%) [5,9,13,14,15,16,17] exhibited considerable bias, which could lead to incorrect conclusions, often due to gaps in information or reporting errors.

The review employed the Cochrane "Risk of Bias" tool to assess RCTs. This tool, developed by the Cochrane Collaboration, evaluates bias across five domains, as depicted in **Figure 3:** randomization methods, deviations from intended interventions, missing outcome data, risk assessment, and bias in the selection of reported results.

DISCUSSION:

This systematic review includes 10 studies that investigate the increased risk of obstetrical complications in women with a history of spontaneous abortion. The studies focus on identifying specific risk factors and complications commonly observed in this population, including preterm birth, placental abruption, intrauterine growth restriction (IUGR), and pre-eclampsia. The aim of the review is to provide insight into these associated risk factors and complications in order to inform the development of tailored antenatal care plans for women with such a history, thereby minimizing the risk of adverse outcomes during delivery. This information is essential for healthcare providers to establish individualized care strategies, incorporating closer monitoring, early interventions, and specific treatments to reduce the risk of complications throughout pregnancy and delivery.

In present systematic review majority studies **Agrawal S, et al.,**[5] **Nehal N**[9] **Vijayalakshmi et al.,**[12] **Jayakumar et al.,**[15] **Muzaffar et al.,**[17] and **Michal et al.,**[18] showed that women with history of SAB was associated with a variety of adverse obstetrical outcomes such PROM, Preterm delivery, IUGR Fetal distress.

Ghosh et al., found that 16% of mothers with a history of SAB developed placenta previa, while 8% experienced placental abruption. Furthermore, pregnancy-induced hypertension was present in 16% of these cases, and 24% of the mothers underwent cesarean sections. Preterm delivery rates were reported at 12% for deliveries before 32 weeks and 20% for those before 36 weeks, while low birth weight and fetal growth restriction were observed in 24% and 12% of cases, respectively. The study concluded that proper antenatal care could significantly improve pregnancy outcomes by reducing maternal and fetal complications.

A systematic review and meta-analysis conducted by **Jia D et al.,** which included 15 studies, highlighted significant associations between RSA and various adverse outcomes in women with spontaneous conception. Their findings revealed that women with a history of RSA had increased odds of developing gestational diabetes (Odds Ratio [OR] 2.21; 95% Confidence Interval [CI]: 1.70–2.87, p < 0.001), preeclampsia (OR 2.06; 95% CI: 1.49–2.86, p < 0.001), and placenta previa (OR 1.82; 95% CI: 1.09–3.02, p = 0.021). Additionally, the risk of placental abruption was higher (OR 1.67; 95% CI: 1.36–2.06, p < 0.001), and there was a significant association with miscarriage (OR 6.37; 95% CI: 3.83–10.57, p < 0.001). Women with a history of RSA also faced increased risks of preterm birth (OR 1.80; 95% CI: 1.36–2.37, p < 0.001), cesarean section (OR 1.47; 95% CI: 1.13–1.91, p = 0.004), perinatal death (OR 2.24; 95% CI: 1.39–3.60, p = 0.001), and neonatal intensive care unit (NICU) admission (OR 1.39; 95% CI: 1.01–1.92, p = 0.047).

With regard to SAB, recurrent abortion was the most studied. Many studies have shown that recurrent abortion was associated with a variety of adverse obstetrical outcomes, including preeclampsia, premature delivery, small for gestational-age infants, placental abruption, pregnancy complications related to placental dysfunction, etc**. [21,22]**

Cervical insufficiency syndrome affects approximately 1% of the obstetric population and is characterized by recurrent spontaneous preterm births and/or spontaneous abortions in the second trimester of pregnancy. A systematic review and meta-analysis by **Brittain, J.J. et al., [23]** found that the risk of cervical dysfunction was 1.9–2.1 times higher in women with a history of recurrent spontaneous abortions or spontaneous abortions.

CONCLUSION:

Women with a history of previous spontaneous abortion are at an increased risk of complications in subsequent pregnancies. Significant associations have been found between previous spontaneous abortion and adverse outcomes such as preterm delivery, PROM, IUGR, and low birth weight.Therefore, careful monitoring should be provided for all women, not just those with a history of recurrent pregnancy loss.

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