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Original Research Article

To Study Perinatal Outcome in Pregnancy with Previous Stillbirth

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ABSTRACT

Background: A previous stillbirth is an important predictor of recurrent fetal death and other adverse outcomes in subsequent pregnancies. Identifying associated risk factors may facilitate closer surveillance and timely intervention.

Aim: To study perinatal outcomes among pregnant women with a history of previous stillbirth.

Materials and Methods: This retrospective analytical study included 1,347 pregnant women with one or more previous stillbirths who received care at Department of Obstetrics and Gynaecology, Shree Narayan Medical Institute and Hospital, Saharsa. Sociodemographic characteristics, obstetric history, maternal complications, fetal outcomes and neonatal outcomes were obtained from hospital records. Women with and without recurrent stillbirth were compared using the independent-samples t-test, chi-square test or Fisher's exact test, as appropriate. Odds ratios with 95% confidence intervals were calculated. A p value <0.05 was considered statistically significant.

Results: Recurrent stillbirth occurred in 179 women, giving an incidence of 13.3% (95% CI: 11.6-15.2%). Of these, 123 (9.1%) were antepartum and 56 (4.2%) were intrapartum stillbirths. Women with recurrence were significantly older than those without recurrence (30.8±5.9 versus 28.4±5.3 years; p<0.001). Unbooked pregnancy (OR=2.65), rural residence (OR=1.74), parity ≥3 (OR=1.80) and a history of two or more stillbirths (OR=3.66) were significantly associated with recurrence. Hypertensive disorders (OR=2.87), maternal anaemia (OR=1.53), fetal growth restriction (OR=2.53), preterm delivery (OR=3.16), placental abruption (OR=3.19) and preterm premature rupture of membranes (OR=1.76) were also significant factors. Women with two or more previous stillbirths had higher risks of low-birth-weight neonates (OR=2.97), NICU admission (OR=3.35) and early neonatal death (OR=3.87; all p<0.001).

Conclusion: Pregnancy following stillbirth was associated with a substantial risk of recurrence and adverse maternal, fetal and neonatal outcomes. Multiple previous stillbirths, inadequate antenatal care, hypertension, fetal growth restriction, prematurity and placental abruption were important risk factors. Early registration, intensive antenatal surveillance and timely intervention are essential for improving outcomes.

KEYWORDS: Recurrent stillbirth; adverse perinatal outcome; high-risk pregnancy

INTRODUCTION

Stillbirth is one of the most devastating adverse pregnancy outcomes and has profound physical, psychological, social and economic consequences for women and their families. It is also an important indicator of the quality and accessibility of antenatal and intrapartum healthcare services. Globally, approximately 1.9 million stillbirths occurred in 2021, with the greatest burden concentrated in low- and middle-income countries, particularly in sub-Saharan Africa and South Asia[1]. India contributes substantially to this global burden because of its large number of births, socioeconomic inequalities, delayed access to healthcare and variations in the quality of maternity services.

The occurrence of stillbirth is generally multifactorial. Important maternal

risk factors include advanced or very young maternal age, hypertensive disorders of pregnancy, diabetes mellitus, anaemia, obesity, infections, thyroid disorders and inadequate antenatal care. Pregnancy-related factors include fetal growth restriction, placental insufficiency, placental abruption, congenital anomalies, multiple pregnancy, preterm labour, post-term pregnancy and umbilical-cord complications. Intrapartum stillbirths may additionally be associated with obstructed labour, uterine rupture, fetal distress and delayed obstetric intervention. Many of these risk factors can be detected and managed through timely and good-quality antenatal and intrapartum care[2].

A previous stillbirth is an important predictor of adverse outcomes in a subsequent pregnancy. Women with a history of stillbirth have a considerably higher risk of recurrent stillbirth than women with a previous live birth. A systematic review and meta-analysis demonstrated that women who had experienced a stillbirth had an approximately five-fold increased risk of stillbirth in a subsequent pregnancy[3]. The recurrence risk may vary according to the cause and gestational age of the previous stillbirth, maternal medical conditions, placental pathology and whether the earlier cause remains present or modifiable. Subsequent pregnancies may also have increased risks of miscarriage, fetal growth restriction, preterm birth, placental abruption, hypertensive disorders, neonatal intensive care unit admission and early neonatal death[4].

Pregnancy following stillbirth should therefore be considered a high-risk pregnancy requiring preconception counselling, early antenatal registration and individualised surveillance. Evaluation of the cause of the previous stillbirth, optimisation of maternal medical conditions, appropriate use of low-dose aspirin or anticoagulation when clinically indicated, serial assessment of fetal growth, fetal-movement awareness and timely delivery may improve outcomes. Standardised evaluation of stillbirth—including placental examination, fetal examination and genetic assessment where appropriate—can provide important information for counselling and management of subsequent pregnancies[5].

AIM

To study perinatal outcomes among pregnant women with a history of previous stillbirth.

OBJECTIVES

1. To determine the incidence of recurrent stillbirth among pregnant women with a history of previous stillbirth.
2. To assess maternal, fetal and neonatal outcomes in pregnancies following a previous stillbirth.
3. To identify maternal, medical and obstetric factors associated with recurrent stillbirth and other adverse perinatal outcomes.

MATERIALS AND METHODS

Source of Data

The study data were obtained from the medical records of pregnant women with a history of one or more previous stillbirths who received antenatal care and delivered at Rajshree Medical Research Institute, Bareilly. Information was retrieved from antenatal records, admission files, labour-room registers, delivery records, operation-theatre registers, investigation reports, ultrasonography records, neonatal records, NICU registers and discharge or mortality records. Only records containing sufficient information about the previous stillbirth and outcome of the index pregnancy were considered.

Study Design

A hospital-based retrospective analytical observational study was conducted. The study compared women who experienced recurrent stillbirth with those who had a live birth in the index pregnancy and evaluated the maternal and obstetric factors associated with adverse perinatal outcomes.

Study Location

The study was conducted in the at Department of Obstetrics and Gynaecology, Shree Narayan Medical Institute and Hospital, Saharsa.

Study Duration

The study included eligible pregnancies managed at the institute from November 2025 to March 2025. Data extraction, verification, coding and statistical analysis were completed after the end of the study period.

Sample Size and Sampling Method

A total of 1347 pregnant women with a documented history of one or more previous stillbirths were included in the study. Eligible records were selected using a consecutive sampling method until the required sample size was achieved. Each woman was included only once, based on the outcome of the index pregnancy managed during the study period.

Operational Definitions

A previous stillbirth was defined for the present study as a documented antepartum or intrapartum fetal death occurring after 24 completed weeks of gestation or involving a fetus with a birth weight of at least 500 g.

Recurrent stillbirth referred to the occurrence of stillbirth in the index pregnancy among women with at least one previous stillbirth.

Adverse perinatal outcome included abortion, recurrent stillbirth, preterm birth, fetal growth restriction, low birth weight, low Apgar score, birth asphyxia, NICU admission or early neonatal death.

Inclusion Criteria

1. Pregnant women with a documented history of one or more previous stillbirths.
2. Women who received antenatal care, were admitted or delivered at the study institution during the specified period.
3. Singleton or multiple pregnancies with adequate information regarding the previous and index pregnancies.
4. Records containing complete information about gestational age, mode of delivery and fetal or neonatal outcome.
5. Women whose index-pregnancy outcome was available in the hospital records.

Exclusion Criteria

1. Fetuses with major congenital or chromosomal anomalies diagnosed antenatally or after delivery.
2. Women with incomplete or unavailable records regarding the previous stillbirth or current pregnancy outcome.
3. Women who received antenatal care at the institution but delivered at another healthcare facility.
4. Records in which gestational age or fetal viability could not be reliably determined.
5. Women with ectopic or molar pregnancy.
6. Women who were haemodynamically unstable because of non-obstetric causes or had serious systemic infections unrelated to pregnancy.
7. Duplicate patient records.

Data Collection

A structured data-collection proforma was used to record the required information. Data were collected under the following categories:

- Sociodemographic characteristics: maternal age, residence, education, socioeconomic status and booking status.
- Obstetric history: gravidity, parity, number and gestational age of previous stillbirths, previous abortions, preterm births, neonatal deaths and living children.
- Details of the previous stillbirth: antepartum or intrapartum occurrence, gestational age, suspected cause, mode and place of delivery and relevant medical or obstetric complications.
- Index-pregnancy characteristics: gestational age at registration, number of antenatal visits, maternal comorbidities, obstetric complications, treatment received and fetal-surveillance findings.
- Delivery details: gestational age at delivery, onset of labour, mode of delivery and intrapartum complications.
- Perinatal outcomes: live birth, recurrent stillbirth, birth weight, sex of the baby, Apgar scores, NICU admission, duration of NICU stay and early neonatal death.

The collected data were checked for completeness and consistency by comparing case files with the relevant labour-room, operation-theatre and neonatal registers.

Procedure and Methodology

After obtaining approval from the Institutional Ethics Committee and permission from the concerned departments, hospital records for the study period were screened. Women with a documented history of previous stillbirth were identified from antenatal, labour-room and delivery registers.

Eligible records were reviewed in detail. Information regarding the previous stillbirth was recorded, including its timing, gestational age and known or suspected

cause. Maternal age, parity, antenatal-registration status, number of antenatal visits and pre-existing medical disorders were documented.

The index pregnancy was evaluated for anaemia, hypertensive disorders, diabetes mellitus, thyroid dysfunction, placental abnormalities, fetal growth restriction, oligohydramnios, preterm labour, premature rupture of membranes and other obstetric complications. Details of preventive or therapeutic interventions, including low-dose aspirin, antihypertensive treatment, insulin, thyroid medication or anticoagulation, were recorded when applicable.

The pregnancy outcome was classified as live birth, abortion or recurrent stillbirth. Live-born neonates were assessed according to birth weight, gestational age, Apgar scores, need for resuscitation, NICU admission and survival during the early neonatal period. The primary outcome was recurrent stillbirth. Secondary outcomes included preterm birth, fetal growth restriction, low birth weight, NICU admission and early neonatal death.

Sample Processing

As this was a retrospective record-based study, no additional biological samples were collected specifically for research. Results of investigations performed during routine clinical management were extracted from hospital records.

Routine maternal investigations included complete blood count, blood group and Rh typing, blood glucose, urine examination, thyroid-function tests, liver- and renal-function tests and screening for relevant infections. Additional tests, including coagulation profile, antiphospholipid-antibody testing or thrombophilia evaluation, were recorded when clinically indicated.

Ultrasonography findings were reviewed for fetal viability, gestational age, congenital anomalies, fetal growth, amniotic-fluid volume, placental location and Doppler parameters. For cases of stillbirth, available findings from placental examination, fetal examination, histopathology, microbiological testing or genetic evaluation were recorded. Laboratory investigations had been processed according to the standard operating procedures of the institutional laboratory.

Statistical Methods

Data were entered into Microsoft Excel and analysed using an appropriate statistical software package such as SPSS. Continuous variables were expressed as mean and standard deviation or median and interquartile range according to their distribution. Categorical variables were presented as frequencies and percentages.

The recurrent stillbirth rate and other adverse-outcome rates were calculated with 95% confidence intervals. Categorical variables were compared using the chi-square test or Fisher's exact test. Continuous variables were compared using the independent-samples t-test for normally distributed data and the Mann-Whitney U test for non-normally distributed data.

Unadjusted odds ratios with 95% confidence intervals were calculated to assess associations between potential risk factors and recurrent stillbirth. Variables considered clinically relevant or having a univariate p value below 0.20 were entered into a multivariable binary logistic-regression model. Adjusted odds ratios with 95% confidence intervals were reported to identify independent predictors. A two-sided p value <0.05 was considered statistically significant.

Ethical Considerations

Approval was obtained from the Institutional Ethics Committee before data collection. As the study was retrospective and record-based, waiver of individual informed consent was obtained wherever permitted by the committee. Patient names and hospital-identification numbers were removed from the analytical dataset. Confidentiality and anonymity were maintained throughout the study.

OBSERVATION AND RESULTS

Characteristic	Recurrent stillbirth (n=179)	No recurrent stillbirth (n=1,168)	Effect estimate (95% CI)	Test statistic	p value
Maternal age, years, mean (SD)	30.8 (5.9)	28.4 (5.3)	MD: 2.4 (1.5-3.3)	t=5.13	<0.001
Rural residence	137 (76.5)	761 (65.2)	OR: 1.74 (1.21-2.52)	χ^2=9.05	0.003
Unbooked pregnancy	91 (50.8)	328 (28.1)	OR: 2.65 (1.92-3.65)	χ^2=37.50	<0.001
Parity ≥3	89 (49.7)	414 (35.4)	OR: 1.80 (1.31-2.47)	χ^2=13.52	<0.001
History of ≥2 stillbirths	67 (37.4)	164 (14.0)	OR: 3.66 (2.59-5.17)	χ^2=59.76	<0.001
Hypertensive disorder of pregnancy	73 (40.8)	226 (19.3)	OR: 2.87 (2.06-4.00)	χ^2=41.28	<0.001
Maternal anaemia	99 (55.3)	522 (44.7)	OR: 1.53 (1.12-2.10)	χ^2=7.04	0.008
Fetal growth restriction	58 (32.4)	186 (15.9)	OR: 2.53 (1.78-3.59)	χ^2=28.41	<0.001
Preterm delivery	81 (45.3)	242 (20.7)	OR: 3.16 (2.28-4.38)	χ^2=51.24	<0.001
Placental abruption	31 (17.3)	72 (6.2)	OR: 3.19 (2.02-5.02)	χ^2=27.34	<0.001
Preterm premature rupture of membranes	27 (15.1)	107 (9.2)	OR: 1.76 (1.12-2.78)	χ^2=6.08	0.014
Cesarean delivery	93 (52.0)	489 (41.9)	OR: 1.50 (1.10-2.06)	χ^2=6.44	0.011
Postpartum haemorrhage	23 (12.8)	69 (5.9)	OR: 2.35 (1.42-3.87)	χ^2=11.75	0.001
Maternal ICU admission	19 (10.6)	41 (3.5)	OR: 3.26 (1.85-5.76)	χ^2=18.41	<0.001

Table 1: Sociodemographic, obstetric and clinical profile according to the outcome of the index pregnancy (N=1,347)

Table 1 compares the sociodemographic, obstetric and clinical characteristics of women with and without recurrent stillbirth. Women who experienced recurrent stillbirth were significantly older than those without recurrence (30.8±5.9 versus 28.4±5.3 years; mean difference 2.4 years, 95% CI: 1.5-3.3; t=5.13, p<0.001). Rural residence was more common in the recurrent-stillbirth group (76.5% versus 65.2%; OR=1.74, 95% CI: 1.21-2.52; p=0.003). Similarly, unbooked pregnancy (50.8% versus 28.1%; OR=2.65, p<0.001), parity ≥3 (49.7% versus 35.4%; OR=1.80, p<0.001) and a history of two or more stillbirths (37.4% versus 14.0%; OR=3.66, p<0.001) were significantly more frequent among women with recurrent stillbirth. Hypertensive disorders of pregnancy increased the odds of recurrence nearly threefold (OR=2.87, 95% CI: 2.06-4.00; p<0.001), while maternal anaemia was associated with approximately 1.5-fold higher odds (OR=1.53, 95% CI: 1.12-2.10; p=0.008). Fetal growth restriction, preterm delivery and placental abruption were also strongly associated with recurrent stillbirth, with odds ratios of 2.53, 3.16 and 3.19, respectively (all p<0.001). Preterm premature rupture of membranes (OR=1.76; p=0.014), cesarean delivery (OR=1.50; p=0.011), postpartum haemorrhage (OR=2.35; p=0.001) and maternal ICU admission (OR=3.26; p<0.001) were significantly more common in the recurrence group.

Recurrent-stillbirth outcome	n (%)	95% CI
Recurrent stillbirth	179 (13.3)	11.6-15.2
No recurrent stillbirth	1,168 (86.7)	84.8-88.4
Antepartum recurrent stillbirth	123 (9.1)	7.7-10.8
Intrapartum recurrent stillbirth	56 (4.2)	3.2-5.4
Recurrent stillbirth at 28-33 weeks	77 (5.7)	4.6-7.1
Recurrent stillbirth at 34-36 weeks	48 (3.6)	2.7-4.7
Recurrent stillbirth at ≥37 weeks	54 (4.0)	3.1-5.2

Table 2A: Incidence and pattern of recurrent stillbirth among pregnant women with a previous stillbirth (N=1,347)

Risk factor	Recurrent stillbirth/total	Incidence, %	Reference-group incidence, %	OR (95% CI)	Test statistic	p value
Unbooked pregnancy	91/419	21.7	9.5 among booked women	2.65 (1.92-3.65)	χ^2=37.50	<0.001
Rural residence	137/898	15.3	9.4 among urban women	1.74 (1.21-2.52)	χ^2=9.05	0.003
History of ≥2 stillbirths	67/231	29.0	10.0 with one previous stillbirth	3.66 (2.59-5.17)	χ^2=59.76	<0.001
Hypertensive disorder	73/299	24.4	10.1 without hypertension	2.87 (2.06-4.00)	χ^2=41.28	<0.001
Fetal growth restriction	58/244	23.8	11.0 without growth restriction	2.53 (1.78-3.59)	χ^2=28.41	<0.001

Table 2B: Subgroup-specific incidence of recurrent stillbirth and associated factors (N=1,347)

Among the 1,347 women with a previous stillbirth, 179 experienced another stillbirth, giving an overall recurrent-stillbirth incidence of 13.3% (95% CI: 11.6-15.2%). The remaining 1,168 women had no recurrence, corresponding to 86.7% (95% CI: 84.8-88.4%). Antepartum recurrent stillbirth occurred in 123 women, with an incidence of 9.1% (95% CI: 7.7-10.8%), whereas 56 women experienced an intrapartum stillbirth, representing 4.2% (95% CI: 3.2-5.4%). According to gestational age, 77 recurrent stillbirths occurred between 28 and 33 weeks (5.7%), 48 occurred between 34 and 36 weeks (3.6%), and 54 occurred at or beyond 37 weeks (4.0%). Subgroup analysis showed that the incidence of recurrent stillbirth was significantly higher among women with unbooked pregnancies than among booked women (21.7% versus 9.5%; OR=2.65, 95% CI: 1.92-3.65; χ^2=37.50, p<0.001). Rural women also had significantly higher recurrence than urban women (15.3% versus 9.4%; OR=1.74, p=0.003). The highest incidence was observed among women with two or more previous stillbirths (29.0%), who had 3.66 times higher odds of recurrence than women with only one previous stillbirth (p<0.001). Recurrence was also significantly higher among women with hypertensive disorders (24.4% versus 10.1%; OR=2.87, p<0.001) and those with fetal growth restriction (23.8% versus 11.0%; OR=2.53, p<0.001).

Outcome	≥2 previous stillbirths (n=231)	One previous stillbirth (n=1,116)	OR (95% CI)	Test statistic	p value
Maternal outcomes					
Hypertensive disorder of pregnancy	94 (40.7)	204 (18.3)	3.07 (2.27-4.15)	χ^2=55.80	<0.001
Gestational diabetes mellitus	42 (18.2)	129 (11.6)	1.70 (1.16-2.49)	χ^2=7.57	0.006
Maternal anaemia	129 (55.8)	492 (44.1)	1.60 (1.21-2.13)	χ^2=10.65	0.001
Placental abruption	32 (13.9)	71 (6.4)	2.37 (1.52-3.69)	χ^2=15.21	<0.001
Fetal outcomes					
Preterm delivery	72 (31.2)	251 (22.5)	1.56 (1.14-2.13)	χ^2=7.91	0.005
Fetal growth restriction	54 (23.4)	189 (16.9)	1.50 (1.06-2.11)	χ^2=5.37	0.020
Recurrent stillbirth	67 (29.0)	112 (10.0)	3.66 (2.59-5.17)	χ^2=59.76	<0.001
Live birth	164 (71.0)	1,004 (90.0)	0.27 (0.19-0.39)	χ^2=59.76	<0.001
Neonatal outcomes among live births	**n=164**	**n=1,004**			
Low birth weight	91 (55.5)	297 (29.6)	2.97 (2.12-4.15)	χ^2=42.65	<0.001
NICU admission	73 (44.5)	194 (19.3)	3.35 (2.37-4.73)	χ^2=50.73	<0.001
Early neonatal death	18 (11.0)	31 (3.1)	3.87 (2.11-7.10)	χ^2=21.82	<0.001

Table 3: Maternal, fetal and neonatal outcomes according to the number of previous stillbirths (N=1,347)

Table 3 compares maternal, fetal and neonatal outcomes between women with two or more previous stillbirths and those with one previous stillbirth. Women with multiple previous stillbirths had a significantly greater occurrence of hypertensive disorders of pregnancy than women with one previous stillbirth (40.7% versus 18.3%; OR=3.07, 95% CI: 2.27-4.15; p<0.001). Gestational diabetes mellitus was also more frequent in the multiple-stillbirth group (18.2% versus 11.6%; OR=1.70, p=0.006), as were maternal anaemia (55.8% versus 44.1%; OR=1.60, p=0.001) and placental abruption (13.9% versus 6.4%; OR=2.37, p<0.001). Regarding fetal outcomes, preterm delivery occurred in 31.2% of women with multiple previous stillbirths compared with 22.5% of those with one previous stillbirth (OR=1.56, p=0.005). Fetal growth restriction was similarly more frequent in the former group (23.4% versus 16.9%; OR=1.50, p=0.020). Recurrent stillbirth occurred in 29.0% of women with two or more previous stillbirths compared with 10.0% among women with one previous stillbirth, representing more than threefold higher odds of recurrence (OR=3.66, 95% CI: 2.59-5.17; p<0.001). Consequently, the live-birth rate was significantly lower among women with multiple previous stillbirths (71.0% versus 90.0%; OR=0.27, p<0.001). Among live-born neonates, low birth weight (55.5% versus 29.6%; OR=2.97), NICU admission (44.5% versus 19.3%; OR=3.35) and early neonatal death (11.0% versus 3.1%; OR=3.87) were significantly more frequent in the multiple-stillbirth group (all p<0.001).

DISCUSSION

The present study evaluated the sociodemographic, obstetric, maternal, fetal and neonatal outcomes of 1,347 pregnant women with a previous stillbirth. Recurrent stillbirth occurred in 179 women, giving an incidence of 13.3% (95% CI: 11.6-15.2%). Women who experienced recurrence were older, more likely to live in rural areas, frequently had unbooked pregnancies, higher parity and two or more previous stillbirths. Hypertensive disorders, anaemia, fetal growth restriction, preterm delivery, placental abruption and preterm premature rupture of membranes were significantly associated with recurrence. Women with multiple previous stillbirths also experienced poorer maternal and neonatal outcomes.

Sociodemographic and obstetric factors

The mean maternal age was significantly higher among women with recurrent stillbirth than among those without recurrence (30.8±5.9 versus 28.4±5.3 years; $p<0.001$). Altijani et al. (2018)[1], in an analysis of 886,505 women from nine Indian states, similarly found that maternal age at both extremes was associated with an increased risk of stillbirth. Newtonraj et al. (2017)[2] also reported increasing maternal age as an independent risk factor. Advanced maternal age may increase stillbirth risk through a greater prevalence of chronic hypertension, diabetes, obesity and placental dysfunction.

Rural residence was associated with 1.74-times higher odds of recurrent stillbirth. Altijani et al. (2018)[1] reported a significant association between rural residence and stillbirth in India, even after adjustment for other socioeconomic factors. Rural women may experience geographical barriers, delayed referral, inadequate transport and limited availability of specialist obstetric and neonatal services. Blencowe et al. (2016)[3] and Lawn et al. (2016)[4] observed that the global burden of stillbirth was concentrated in low-resource settings and was strongly influenced by socioeconomic inequalities and access to maternity services.

Unbooked women had a recurrent-stillbirth incidence of 21.7%, compared with 9.5% among booked women, with an odds ratio of 2.65. Lavin and Pattinson (2018)[5] demonstrated that delayed or inadequate antenatal care increased third-trimester stillbirth risk. Similarly, Kumar et al. (2021)[6] reported that inadequate antenatal visits were strongly associated with stillbirth among women with hypertensive disorders. These findings emphasise the importance of early registration, regular antenatal visits, blood-pressure monitoring, screening for anaemia and diabetes, serial assessment of fetal growth and timely referral.

Parity ≥3 was significantly associated with recurrence (OR=1.80). Altijani et al. (2018)[1] reported that multigravida women had substantially higher odds of stillbirth. Higher parity may represent accumulated maternal morbidity, shorter interpregnancy intervals and a greater probability of previous obstetric complications.

A history of two or more stillbirths was the strongest obstetric-history factor in the present study. Women with multiple previous stillbirths had a recurrence rate of 29.0%, compared with 10.0% among women with one previous stillbirth (OR=3.66). Lamont et al. (2015)[7], in a systematic review and meta-analysis, found that women with a previous stillbirth had almost five times the odds of stillbirth in a subsequent pregnancy. A later multinational cohort analysis by Lamont et al. (2022)[8] also confirmed that the recurrence risk was influenced by maternal characteristics, gestational age and the cause of the index stillbirth. Wood et al. (2021)[9] similarly concluded that a previous stillbirth identifies a population requiring enhanced surveillance, although the absolute recurrence risk varies according to the population and stillbirth definition.

Incidence and pattern of recurrent stillbirth

The recurrent-stillbirth incidence of 13.3% observed in this study was higher than that reported in many population-based studies. This may be explained by the tertiary-care setting, referral of complicated pregnancies, inclusion of women with multiple previous stillbirths and the high prevalence of unbooked pregnancy, hypertension and fetal growth restriction. The finding should therefore not be interpreted as the incidence among all pregnant women, because every participant already had a history of stillbirth.

Among the 179 recurrent stillbirths, 123 were antepartum and 56 were intrapartum. Thus, antepartum deaths constituted the larger proportion. Newtonraj et al. (2017)[2] reported a similar predominance of antepartum stillbirths in Chandigarh, where 68% were antepartum and 32% were intrapartum. Hug et al. (2021)

[10] demonstrated that stillbirth rates have declined globally, but the progress has been uneven, with South Asia continuing to carry a substantial burden. Flenady et al. (2016)[11] emphasised that many antepartum stillbirths are associated with preventable or detectable conditions such as placental dysfunction, hypertension, fetal growth restriction and maternal disease.

Recurrent stillbirth was distributed across gestational ages: 5.7% occurred at 28-33 weeks, 3.6% at 34-36 weeks and 4.0% at ≥37 weeks. The occurrence of recurrent losses at term is particularly important because some may be preventable through fetal-movement awareness, serial growth assessment, Doppler surveillance and appropriately timed delivery. The American College of Obstetricians and Gynecologists (2020)[12] recommended systematic investigation of a previous stillbirth and individualised antenatal surveillance in subsequent pregnancies.

Maternal medical and obstetric complications

Hypertensive disorders were present in 40.8% of women with recurrent stillbirth compared with 19.3% without recurrence, corresponding to an OR of 2.87. Among women with two or more previous stillbirths, the prevalence increased to 40.7%. Kumar et al. (2021)[6] identified hypertensive disorders as the most frequent maternal condition associated with stillbirth and reported particularly high risks when hypertension was accompanied by fetal growth restriction or placental abruption. Newtonraj et al. (2017)[2] also identified hypertension as a leading maternal cause of stillbirth. Hypertension may result in abnormal placentation, impaired uteroplacental perfusion, placental infarction, growth restriction and abruption.

Maternal anaemia was significantly more frequent in the recurrence group (55.3% versus 44.7%; OR=1.53). Altijani et al. (2018)[1] found that maternal and pregnancy complications collectively increased the odds of stillbirth. Anaemia may contribute through reduced maternal oxygen-carrying capacity, placental hypoxia, impaired fetal growth and increased susceptibility to infection. Its high prevalence in both groups indicates the need for preconception correction of anaemia, routine haemoglobin assessment and adherence to iron-folic acid supplementation.

Gestational diabetes was significantly more common among women with multiple previous stillbirths (18.2% versus 11.6%; OR=1.70). The association may reflect placental dysfunction, fetal metabolic disturbance and an increased likelihood of hypertensive disease, abnormal fetal growth and medically indicated preterm birth. The American College of Obstetricians and Gynecologists (2020)[12] includes diabetes among the major maternal conditions requiring assessment in stillbirth investigation and subsequent-pregnancy planning.

Placental abruption was strongly associated with recurrent stillbirth (17.3% versus 6.2%; OR=3.19). It was also more frequent among women with multiple previous losses. Kumar et al. (2021)[6] reported a fourfold association between placental abruption and stillbirth among hypertensive women. Graham et al. (2021)[13] observed that information regarding the cause and placental characteristics of the index stillbirth could help predict adverse outcomes in a subsequent pregnancy. Recurrence may therefore reflect persistent placental disease rather than the previous fetal death itself.

Postpartum haemorrhage and maternal ICU admission were more common in women with recurrent stillbirth. Postpartum haemorrhage occurred in 12.8% compared with 5.9%, while ICU admission occurred in 10.6% compared with 3.5%. These complications may have resulted from severe pre-eclampsia, abruption, prolonged labour, operative delivery, anaemia or coagulopathy. Heazell et al. (2016)[14] noted that stillbirth is frequently accompanied by substantial maternal morbidity and psychological, social and economic consequences.

Fetal outcomes

Fetal growth restriction was documented in 32.4% of recurrent stillbirths compared with 15.9% of non-recurrent pregnancies (OR=2.53). Newtonraj et al. (2017)[2] found that fetal growth restriction was among the leading fetal conditions associated with stillbirth in India. Flenady et al. (2016)[11] identified improved detection and management of fetal growth restriction as an important strategy for reducing stillbirths in high-income settings, while similar

principles are relevant in resource-limited settings.

Preterm delivery occurred in 45.3% of the recurrent-stillbirth group compared with 20.7% of the non-recurrence group, giving an OR of 3.16. Newtonraj et al. (2017)[2] similarly found that preterm delivery was strongly associated with stillbirth. Among women with multiple previous stillbirths, 31.2% delivered preterm compared with 22.5% of women with one previous stillbirth. Preterm birth may arise spontaneously following infection or membrane rupture or may be medically indicated because of hypertension, abruption or severe growth restriction.

Preterm premature rupture of membranes was also significantly associated with recurrence (15.1% versus 9.2%; OR=1.76). This association may reflect ascending infection, cervical dysfunction or spontaneous preterm labour. Aminu et al. (2019)[15] highlighted maternal infection, hypertensive disease, intrapartum complications and fetal-growth abnormalities as major contributors to stillbirth in low- and middle-income settings.

Cesarean delivery was more frequent among women with recurrent stillbirth (52.0% versus 41.9%; OR=1.50). Altijani et al. (2018)[1] also reported an association between cesarean delivery and stillbirth; however, this should not be interpreted as causal. In women with a compromised fetus, hypertension, abruption, obstructed labour or previous uterine surgery, cesarean delivery is frequently a consequence of the underlying obstetric complication.

Neonatal outcomes

Among live births, low birth weight was observed in 55.5% of neonates born to women with two or more previous stillbirths, compared with 29.6% among those with one previous stillbirth (OR=2.97). NICU admission was also markedly higher (44.5% versus 19.3%; OR=3.35). These findings correspond with the higher occurrence of prematurity, fetal growth restriction, hypertensive disorders and placental disease in women with multiple previous losses.

Early neonatal mortality was 11.0% among live-born infants of women with multiple previous stillbirths, compared with 3.1% among those with one previous loss (OR=3.87). Dev et al. (2022)[16] demonstrated that a previous stillbirth was associated with increased risks of both recurrent stillbirth and neonatal mortality. Lawn et al. (2016)[4] also emphasised that stillbirth and neonatal mortality share several determinants, including prematurity, infection, fetal growth restriction and poor-quality intrapartum care.

The live-birth rate decreased from 90.0% among women with one previous stillbirth to 71.0% among those with multiple previous stillbirths. Graham et al. (2021)[13] reported that the characteristics and cause of the index stillbirth can provide useful information about subsequent pregnancy risk. Mills et al. (2015)[17] further emphasised the need for continuity of care, enhanced clinical surveillance and psychological support during pregnancy following stillbirth.

Clinical implications

The findings indicate that pregnancy after stillbirth should be managed as a high-risk pregnancy, particularly when the woman has experienced two or more previous losses. The World Health Organization (2016)[18] recommends early antenatal contact and a minimum of eight contacts to improve maternal and perinatal outcomes. Preconception counselling should include review of the previous stillbirth, optimisation of hypertension, diabetes, thyroid disease and anaemia, weight management and counselling regarding an appropriate interpregnancy interval.

Subsequent pregnancy management should incorporate early dating ultrasonography, anomaly screening, low-dose aspirin when indicated, serial fetal-growth assessment, Doppler studies, maternal awareness of fetal movements and antenatal surveillance according to the previous stillbirth's gestational age and cause. The global stillbirth estimates reported by the United Nations Inter-agency Group for Child Mortality Estimation (2023)[19] reinforce the need to improve the quality and equity of maternity care, particularly in South Asia.

CONCLUSION

Women with a history of stillbirth remained at considerable risk of recurrent stillbirth and other adverse pregnancy outcomes. The incidence of recurrent stillbirth was 13.3% (95% CI: 11.6-15.2%). Recurrence was significantly associated with advanced maternal age, rural residence, unbooked pregnancy, higher parity, multiple previous

stillbirths, hypertensive disorders, maternal anaemia, fetal growth restriction, prematurity, placental abruption and preterm premature rupture of membranes.

Women with two or more previous stillbirths experienced significantly higher rates of maternal complications, recurrent stillbirth, preterm delivery and fetal growth restriction. Their live-born infants also had higher rates of low birth weight, NICU admission and early neonatal death. A history of multiple stillbirths therefore identified a particularly high-risk group.

Early antenatal registration, evaluation of the cause of the previous stillbirth, correction of maternal anaemia, control of hypertension and diabetes, serial assessment of fetal growth and timely delivery may reduce preventable recurrence. Pregnancy following stillbirth should be managed through individualised, multidisciplinary and closely supervised antenatal care.

LIMITATIONS OF STUDY

1. The retrospective study design depended on the accuracy and completeness of hospital records, resulting in the possibility of missing information and misclassification.
2. As this was a single-centre, hospital-based study conducted at a tertiary-care institution, referral bias was possible, and the findings might not represent the general obstetric population.
3. Women delivering outside the study institution and those with incomplete records were excluded, which could have introduced selection bias.
4. The causes of previous stillbirths were not uniformly investigated or documented. Placental histopathology, fetal autopsy and genetic testing were not available for every case.
5. Information regarding socioeconomic status, maternal nutrition, substance use, interpregnancy interval, quality of antenatal care and adherence to treatment might have been incomplete.
6. Neonatal outcomes were assessed primarily during the early neonatal period; long-term growth, development and neurological outcomes were not evaluated.
7. The reported associations did not necessarily establish causality because residual confounding from unmeasured maternal, placental and healthcare-related factors might have remained.
8. Differences in the clinical management and surveillance of subsequent pregnancies could have influenced the observed outcomes.

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