

ANALYSIS OF STILLBIRTH: A STUDY IN K.A.P. VISWANATHAN GOVERNMENT MEDICAL COLLEGE, MGMGH TRICHY

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Abstract

Background: Stillbirth is a major public health concern that contributes significantly to perinatal mortality. Identifying its causes is essential for implementing preventive strategies. This study aimed to analyse the socio-demographic, clinical, and obstetric factors associated with stillbirths. **Materials and Methods:** This cross-sectional study included 193 women with singleton stillbirths beyond 20 weeks of gestation at K.A.P. Viswanatham Government Medical College, MGMGH, Trichy, from March 2022 to February 2023. Relevant maternal, foetal, and obstetric data were collected. Stillbirth causes were classified using the ReCoDe (Relevant Condition at Death) system. Gestational age was determined using last menstrual period dates or first-trimester ultrasonography. **Result:** Most (71%) of the stillbirths occurred in mothers aged 20–30 years, and 50% occurred in primigravida mothers. Most stillbirths (72%) were preterm (<37 weeks). Obesity (18%) and anaemia (27.46%) were common maternal risk factors. Foetal growth restriction (48.19%) was the most frequent cause of stillbirth. Placental abruption (10.36%) and hypertensive disorders of pregnancy (22.80%) were other significant contributors. Vaginal delivery was the most common mode (80%). Intrapartum asphyxia was present in 4.66% of cases, and 16.58% of stillbirths remained unexplained. Male foetuses were more frequently affected (64.2%) than female foetuses (35.8%). Additionally, 44% of stillborn infants had a birth weight below 1500 g, indicating a strong association between low birth weight and stillbirth risk. **Conclusion:** Foetal growth restriction can lead to stillbirth, as well as anaemia, hypertension, and placental abruption. Antenatal IUGR screening and GAP identify high-risk pregnancies and help reduce stillbirth.

INTRODUCTION

Stillbirth is considered a very important event in a mother's life, and even for the treating obstetrician. The WHO has defined birth as "any baby that is born with no sign of life after 28 weeks of gestation with more than a thousand grams of weight and a crown-heel length of more than 35 cm. Sentinel surveillance in India has used two definitions for stillbirth.^[1] The first one is known as early foetal death, which is defined as the death of any foetus that weighs at least 500 g or which has completed 20 weeks of gestation or CHL of 25 cm, whereas Late foetal deaths are considered any fatal death occurring among foetus weighing at least thousand grams or that has completed 28 weeks of gestation with a CHL of 35 cm.^[2]

Perinatal mortality is a quality parameter for obstetric and neonatal care. Stillbirths are significant contributors to perinatal mortality. Approximately two-thirds of stillbirths are categorised as unexplained by the present categorisation systems, although there are numerous causes of stillbirth and various classification methods have been proposed to identify the underlying variables and events leading to stillbirth. Its motto is "What went wrong, not necessarily why." This approach, which is based on a population-based cohort study conducted in England, allows for the classification of approximately 85% of stillbirths.^[3] It is organised hierarchically, starting with conditions that impact the foetus and progressing through basic anatomic groups that are further divided into pathophysiologic conditions. The first condition on the list is the main condition that applies to a specific case. The inadequate collection

of stillbirth data and the non-uniform definition of stillbirth make it difficult to compare stillbirth rates between and within countries. Less than 5% of stillbirths worldwide are reported.^[4]

Worldwide, intrauterine foetal demise ranks as the fifth most common cause of mortality. Currently, the pathophysiology underlying foetal death is not well understood. Seventy-six per cent of stillbirths worldwide are recorded.^[5] Global public health initiatives have been aided by the publication of "The Ending Preventable Stillbirths Series Study Group" in The Lancet. The original target was to reduce the stillbirth rate to less than 15/1000. Many developed nations have already attained this, although stillbirth rates are significantly higher in Asia and Africa, primarily due to insufficient access to healthcare providers.^[6,7] This is a terrible incident that will affect society as a whole for a long time. We still do not know enough about the causes of stillbirth. This information can assist individuals affected by grief and, more crucially, in preparing to lower the risk of stillbirth in future pregnancies.

Aim

This study aimed to analyse the sociodemographic and clinical patterns associated with stillbirth and propose strategies to prevent it.

MATERIALS AND METHODS

This cross-sectional study included 193 women from the Department of Obstetrics and Gynaecology at KAPV Government Medical College, Trichy, from March 2022 to February 2023. The study was conducted following approval from the Institutional Ethics Committee, and informed consent was obtained from all the participants.

Inclusion Criteria

All women with singleton antepartum and intrapartum stillbirths above 20 weeks of gestation who were admitted to the labour ward were included.

Exclusion Criteria

All foetal deaths occurring at a gestational age of less than 20 weeks, multifetal gestations, and all instances of second-trimester medical termination of pregnancy (MTP) due to anomalies or preterm premature rupture of membranes (PPROM). Furthermore, women who were admitted after

delivering stillborn babies elsewhere and those who did not provide consent to participate in the study were excluded.

Methods

A hospital-based observational study was conducted using a convenience sampling approach. A comprehensive medical history was obtained for each participant, including maternal age, parity, socioeconomic status, body mass index (BMI), details of prenatal care, and past and current medical and surgical histories. Gestational age was determined using reliable last menstrual period dates or first-trimester ultrasonography. After delivery, detailed examinations of the neonates, placenta, and umbilical cord were conducted.

Foetal growth restriction was assessed using the Relevant Condition at Death (ReCoDe) classification system. The actual birth weight was compared with a customised weight-for-gestational-age chart generated by the Gestation-Related Optimal Weight (GROW) software. The GROW software calculates foetal growth potential by accounting for foetal sex and constitutional characteristics known at the beginning of pregnancy, including maternal height, weight, parity, and ethnic origin. Infants with a birth weight below the 10th percentile for their gestational age were classified as small for gestational age (SGA). The cause of each stillbirth was determined and classified using the ReCoDe system by Gardosi et al.^[3] This system provides a structured approach to identify the underlying factors contributing to foetal demise, ensuring a comprehensive assessment of potential aetiologies. Data are presented as frequencies and percentages.

RESULTS

The majority (71.6%) of the stillbirths occurred in mothers aged 20–30 years. Most patients were primigravida (n = 96, 50%). Regarding gestational age, 69 (36%) were between 32-36 weeks. The socioeconomic class distribution showed that 97 (50.3%) patients belonged to class 4. According to BMI, 80 (41%) women were overweight. Regarding foetal gender, male foetuses were more common (n = 124, 64.2%) [Table 1].

Table 1: Demographic and clinical characteristics

		N (%)
Age (years)	<20	12 (6%)
	20-30	137 (71%)
	>30	44 (23%)
Gravida	Primigravida	96 (50%)
	G2	54 (28%)
	G3	30 (15%)
	>G3	13 (7%)
Gestational age (weeks)	≥37	54 (28%)
	32-36	69 (36%)
	28-32	50 (26%)
	≤28	20 (10%)
Socioeconomic class	3	68 (35.2%)
	4	97 (50.3%)
	5	28 (14.5%)

BMI	Underweight	12 (6%)
	Normal	67 (35%)
	Overweight	80 (41%)
	Obese	34 (18%)
Gender of the foetus	Male	124 (64.2%)
	Female	69 (35.8%)

Regarding birth weight, 84 (44%) neonates weighed <1500 g. Haemoglobin levels were >11 g/dL in 82 (42%) patients. Most deliveries were vaginal (n = 155, 80%). The indications for LSCS included previous LSCS 15 (7.7%), placental abruption 15

(7.7%), antepartum eclampsia with an unfavourable cervix or transverse lie 2 (1.03%), foetal distress 2 (1.03%), and cord prolapse 2 (1.03%). In terms of timing, most cases were antepartum 184 (95%), while intrapartum cases were 9 (5%) [Table 2].

Table 2: Obstetric and neonatal characteristics.

		N (%)
Weight (g)	<1500	84 (44%)
	1501-2500	64 (33%)
	>2500	45 (23%)
Hb level (g/dL)	>11	82 (42%)
	10-10.9	58 (30.1%)
	7-9.9	50 (26%)
	<7	3 (1.4%)
Mode of delivery	Vaginal	155 (80%)
	LSCS	36 (18%)
	Uterine rupture	2 (1%)
Indication	Previous LSCS	15 (7.7%)
	Abruption	15 (7.7%)
	AP Eclampsia (unfavourable cervix, transverse lie)	2 (1.03%)
	Foetal distress	2 (1.03%)
	Cord prolapses	2 (1.03%)
Ante/Intrapartum	Antepartum	184 (95%)
	Intrapartum	9 (5%)

Foetal growth restriction was the most common finding, observed in 93 (48.19%) cases. Placental abruption was identified in 20 (10.36%) patients and oligohydramnios in 22 (11.40%) patients. Among maternal factors, anaemia 53 (27.46%) and

hypertensive diseases during pregnancy 44 (22.80%) were the most prevalent conditions. No identifiable condition was found in 32 (16.58%) patients [Table 3].

Table 3: Causes of stillbirth (ReCoDe classification)

		N (%)	
Group A: foetus	1.1	Lethal congenital anomaly	2 (1.04%)
	1.2	Non-immune hydrops	2 (1.04%)
	1.3	Foetal growth restriction	93 (48.19%)
Group B: Umbilical Cord	2.1	Cord prolapses	5 (2.59%)
	2.2	Constricting loop around the neck	5 (2.59%)
Group C: Placenta	3.1	Abruption	20 (10.36%)
Group D: Amniotic fluid	4.1	Oligohydramnios	22 (11.40%)
	4.2	Polyhydramnios	2 (1.04%)
Group E: Uterus	5.1	Rupture	1 (0.52%)
	5.2	Uterine anomalies	3 (1.55%)
Group F: Mother	6.1	Diabetes	14 (7.25%)
	6.2	Anaemia	53 (27.46%)
	6.3	Hypertensive diseases in pregnancy	44 (22.80%)
	6.4	Diabetes and hypertension	3 (1.55%)
	6.5	Hypothyroidism	4 (2.07%)
	6.6	SLE	1 (0.52%)
	6.7	ITP	1 (0.52%)
Group G: Intrapartum	7.1	Asphyxia	9 (4.66%)
Group H: Trauma	8.1	RTA, Uterine rupture	1 (0.52%)
Group I: Unclassified	1	No relevant condition was identified	32 (16.58%)

DISCUSSION

In our study, most stillbirths occurred in the preterm gestational age group (32–36 weeks), with FGR being the most common cause. Among the 193 stillbirths, 72% were preterm (< 37 weeks), and 28% were term. Most stillborn infants had low birth

weights; 43.7% weighed <1.5 kg, and only 22.3% weighed > 2.5 kg. The relationship between stillbirth and growth restriction has been well-established in previous studies, emphasizing the importance of foetal growth monitoring.^[8]

In our study, 71% of the stillbirths occurred in mothers aged 20-30 years. While maternal age and

parity have been linked to stillbirth in univariate analyses of previous research, multivariate analyses did not confirm these as independent risk factors. However, some studies suggest an increased risk of stillbirth in older mothers.^[9]

A significant number of mothers belonged to lower socioeconomic backgrounds, emphasising the need for targeted interventions to address healthcare disparities in our population. Nohr et al. reported that obesity (BMI >30) was observed in 17.3% of cases, which is a known modifiable risk factor for stillbirth. Pre-pregnancy obesity has been associated with an increased risk of foetal death due to placental dysfunction.^[10] Approximately 80% of stillbirths were delivered vaginally, while 19% required a caesarean section. A history of previous stillbirth was noted in 12 cases, with the majority being preterm and exhibiting FGR. Meta-analyses by Malacova et al. have shown that a prior history of SGA birth and preterm birth doubles the risk of subsequent stillbirth, emphasising the need for strict monitoring and preventive strategies in such cases.^[11]

Anaemia was a major contributor to stillbirths, with 27.5% of mothers presenting with moderate to severe anaemia at admission and 42.6% at their first antenatal visit. Nair et al. reported that anaemia at the first visit and after 28 weeks is associated with a 5-fold and 3-fold increased risk of stillbirth.^[12] Similarly, hypertensive disorders, including gestational hypertension and preeclampsia, were observed in 23% of cases; Allen et al. reported that mild PIH occurred in 7.7% and severe PIH in 1.3%, totalling 9%, with increased risks of SGA births and stillbirths.^[13]

In our study, the ReCoDe system successfully classified 83.8% of the cases, leaving 16.2% unexplained. Similarly, Ajini et al. reported a classification rate of 87.58% using the ReCoDe system in Kerala,^[14] while Shat et al. documented an 87.6% classification rate in Mumbai.^[15] Additionally, Kashif et al. reported that the ReCoDe system classified 81% of cases in Pakistan.^[16]

The Growth Assessment Protocol (GAP) involves risk assessment and management of pregnant mothers, classified as low-risk or high-risk. Serial fundal height measurements or ultrasound estimated foetal weights (EFW) are plotted on GROW charts to identify SGA fetuses, with Doppler parameters used for follow-up. Optimising delivery timing for SGA fetuses can help reduce stillbirth rates and improve perinatal outcomes through early intervention.

In our study, lethal congenital anomalies were observed in 1.04% of cases, whereas FGR was noted in 48.19% of cases. Mackin et al. also emphasised foetal complications, particularly in diabetic pregnancies, where the stillbirth risk was significantly elevated in infants with birth weights <10th percentile, suggesting that FGR plays a critical role in adverse outcomes.^[17] Similarly, Guariglia et al. reported SGA newborns as a significant risk factor for stillbirth (P=0.005, OR 3.63).^[18] We identified placental abruption in 10.36% of the cases. Mackin et

al. and Guariglia et al. indirectly emphasised placental dysfunction by associating stillbirth with maternal conditions like diabetes and excessive weight gain, which contribute to placental insufficiency.^[17,18]

We found anaemia in 27.46% and hypertensive diseases in pregnancy in 22.80%, making them the most common maternal condition. Rossouw et al. reported that a high median HbA1c (8.4%) at delivery was associated with stillbirths in diabetic pregnancies.^[19] While Mackin et al. found that pre-pregnancy and late-pregnancy HbA1c levels significantly increased the risk of stillbirths.^[17] Additionally, Ukah et al. reported that severe maternal morbidity, including cardiac complications (HR 7.00) and renal failure (HR 4.35), was associated with increased mortality.^[20] Intrapartum asphyxia was observed in 4.66% of cases in our study. Guariglia et al. reported an intrapartum stillbirth rate of 0.11%, with SGA newborns and maternal obesity as significant contributors.^[18]

Our study reported that 16.58% of cases had no identifiable conditions. Mackin et al. and Guariglia et al. noted unexplained intrauterine deaths in their analyses. Mackin et al. found that a third of stillbirths occurred at term, with the highest rates in the 38th week (7.0 per 1000 ongoing pregnancies) for type 1 diabetes and the 39th week (9.3 per 1000 ongoing pregnancies) for type 2 diabetes.^[17] Guariglia et al. reported that 10.4% of stillbirths occurred during labour.^[18]

Limitations

As a single-centre study, its findings may not be generalisable to other settings. The retrospective nature of the study may have resulted in missing data, and 16.58% of cases remained unexplained despite the use of the ReCoDe classification. The lack of advanced investigations, such as genetic testing and foetal autopsy, limits diagnostic accuracy. Furthermore, socioeconomic disparities, variability in antenatal care, and the lack of longitudinal follow-up data may have influenced the results.

CONCLUSION

Foetal growth restriction is the leading cause of stillbirth, followed by anaemia, hypertensive disorders, and placental abruption, per the ReCoDe system. Anaemia emphasises the need for timely treatment to lower stillbirth rates. Hypertensive disorders are linked to IUGR and placental abruption, which can be managed with proper antenatal care.

Routine antenatal screening for IUGR can help reduce stillbirths. The GAP from the Perinatal Institute in Birmingham, UK, is an antenatal intervention that combines early pregnancy risk assessment with evidence-based care pathways. It utilises symphysis-fundal height (SFH) measurement or EFW on tailored growth charts, and includes Doppler assessment for slow or stagnant growth. This

strategy promotes timely delivery planning, staff training, and audits, ensuring optimal perinatal outcomes. Addressing modifiable antenatal risk factors, such as preventing anaemia, making lifestyle modifications to reduce obesity, and providing preconception counselling, can further lower the incidence of stillbirths in India. Strengthening healthcare systems through staff training and standardised protocols at primary health centres will aid in the early identification of high-risk pregnancies and facilitate timely referrals to higher centres. Additionally, foetal autopsy and placental histopathology can provide valuable insights into cases where the cause of stillbirth remains unexplained.

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