

Original Article

A Retrospective Analysis of Intrauterine Foetal Demise Cases in a Tertiary Care Hospital: Insights into Maternal Factors and Obstetric Outcomes

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ABSTRACT

Objectives: The objective of this study is to investigate maternal factors and obstetric outcomes associated with intrauterine fetal demise (IUFD) at a tertiary care center in Mangaluru, India, with the aim of identifying key determinants to improve antenatal care and reduce the incidence of stillbirths.

Material and Methods: A retrospective observational study was carried out in the Department of Obstetrics and Gynaecology at K.S. Hegde Medical Academy over a six-year period (2019–2024). The analysis included 66 cases of IUFD/stillbirths occurring beyond 24 weeks of gestation. Cases were categorized using the Re. Co. De. classification system. The study examined maternal, fetal, placental, and socioeconomic factors. Ethical approval was obtained, and all patient data were anonymized to maintain confidentiality.

Results: Among 12,205 total deliveries during the study period, the IUFD/stillbirth rate stood at 5.41%. Notable maternal risk factors included advanced maternal age (30–34 years), nulliparity (42%), and irregular antenatal care attendance (38%). A significant proportion of affected cases belonged to lower socioeconomic strata. Maternal medical conditions contributing to IUFD included gestational diabetes mellitus (15.15%), hypertensive disorders of pregnancy (9.09%), and anemia. Fetal causes such as congenital anomalies and intrapartum asphyxia were observed, along with placental pathologies like chronic uteroplacental insufficiency. When classified using the Re. Co. De. system, 39.39% of IUFD cases were linked to maternal conditions, while 18.18% remained unexplained.

Conclusion: IUFD emerges as a complex, multifactorial issue shaped by maternal health, fetal conditions, and placental pathology. This study underscores the critical role of consistent antenatal care and the timely management of high-risk pregnancies. Socioeconomic disparities remain a key concern, emphasizing the need for targeted public health interventions, including preconceptional counselling and comprehensive prenatal support. Understanding these interconnected factors can guide actionable steps to reduce the stillbirth burden and improve overall pregnancy outcomes.

Keywords: Antenatal care, Intrauterine foetal death, Maternal comorbidities, Re. Co. De. classification, Stillbirth

INTRODUCTION

Intrauterine foetal death (IUFD), though an urgent obstetrical concern, receives comparatively less attention and research globally. It is imperative to acknowledge and integrate stillbirths into global health efforts to ensure comprehensive care for mothers and infants worldwide. According to WHO, the target is to reduce the global stillbirth rate to fewer than 12 stillbirths per 1,000 live births by 2030. This goal aligns with the United Nations Sustainable Development Goals (SDGs), specifically SDG 3 (good health and well-being), which aims to ensure healthy lives and promote well-being for all at all ages.^[1,2] The perinatal mortality surveillance report (CEMACH)^[3] defines stillbirth as ‘a baby delivered

with no signs of life known to have died after 24 completed weeks of pregnancy.’ In 2020, according to India’s main source of vital statistics, the Sample Registration System, India had a stillbirth rate of 3 per 1,000 births, which is 4.6 times lower than the Inter-Agency Group estimate. This number may be an underestimate, as stillbirths are often underreported. In 2020, India’s stillbirth rate of 3 per 1,000 births was higher than the US (2.7), UK (2.7), and Australia (2.39), but lower than the global average of 13.9 per 1,000 births.^[3-5] Extremely distressing is the situation that arises when a foetus passes away abruptly during a pregnancy that had seemed to be entirely normal up until that point. It is an event that puts the doctor’s personal abilities, in addition to their medical skills,

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to the test. To determine the risk of a recurrence, preventive measures, or remedial actions, it is essential to identify specific reasons for foetal mortality among the most likely causes. It is essential for an obstetrician to keep complete documentation of the primary occurrence or circumstance that resulted in the death of the foetus.^[6]

Stillbirth is one of the key indicators of the quality of maternity and child health (MCH) care. Within the United States, stillbirths are responsible for around 60% of all perinatal deaths, and they are able to be avoided to a greater extent.^[7,8] Even though there has been progress made in antenatal care and intrapartum care, stillbirths continue to be a significant, mostly unstudied, and substantial concern in the field of obstetrics all across the world, particularly in developing countries such as India. Hence, we performed this retrospective analysis to shed some light on the possible etiological factors leading to IUFD and stillbirth at a tertiary care centre.

MATERIAL AND METHODS

After obtaining approval from the institutional ethics committee, this retrospective observational study was conducted in the department of Obstetrics and Gynaecology at a tertiary care hospital in Mangaluru between January 2019 and December 2024. For this investigation, all pregnant women who delivered at the hospital with intrauterine foetal death or stillbirth at or after 24 weeks of gestation were included in the study. Informed consent was not obtained as this was a retrospective study utilising existing medical records from the past 5 years, without direct patient interaction. The study followed ethical guidelines, with all data anonymised and approved by the institutional ethics committee. The Institutional Ethics Committee, K.S. Hegde Medical Academy, NITTE University, granted ethical clearance for this study on 30/03/2024 (Approval No. INST.EC/EC/126/2024; Registration No. EC/NEW/INST/2022/KA/0174). The characteristics that were utilized in the research included the following: Maternal age, parity, gestational age, Socio-economic class, booked versus unbooked case, Regular/Irregular follow-ups, maternal comorbidities, placental factors, foetal factors, Intrapartum events, and mode of delivery.

Statistical analysis

The data was entered from a semi-structured proforma into an MS Excel spreadsheet, and the stillbirth rate was studied. Causes of stillbirth were categorised by the Re. Co. De. classification system.

RESULTS

The total number of deliveries in our institution during the study period (between January 2019 and December 2024) was 12,205. This study found 66 eligible patients over the study period with IUFD/stillbirth. The stillbirth rate in our study was 5.41%.

In this study, we observed that the majority of the patients belonged to the 30-34 years age group [Table 1]. Among mothers who experienced IUFD, the majority (54.54%) had a normal BMI (n=36). A significant proportion, 21.21% (14 mothers), were classified as overweight, while 12.12% (eight mothers) were categorized as obese. Parity/previous successful births are also an important factor to be considered in patients who have IUFD. In the present study, it was observed that almost half the study population (42%) who had IUFD were nulliparous.

The gestational age at which the foetal loss occurred can help guide the treating physician towards the possible causes. In the present study, we observed that 47 patients had completed 32 weeks of period of gestation (POG). Out of these, 23 were term pregnancies.

Socio-economic factors determine the nutritional status of the mother and foetus, social practices, access to health care, and the affordability of the family. In this study, the majority belonged to the lower-class socioeconomic group.

While 57 of the 66 women in our study were booked for antenatal care (ANC), 38 had irregular follow-ups despite being advised by the clinician to return regularly, given their high-risk status. We found that regular follow-up of high-risk cases at a tertiary care hospital is essential for standardized monitoring and management, which was the focus of our study. The irregular follow-up may still impact continuity and quality of care.

There are several maternal, foetal, and placental factors and intrapartum events that can lead to IUFD.

Of the 66 cases of IUFD, 18 were referred to our tertiary care centre for further management due to high-risk factors, ultrasound findings indicating intrauterine death (IUD), or signs suggesting impending foetal compromise.

While there are significant overlapping factors influencing the causes of IUD, the study identified specific key contributory factors after analysing each case that prominently impacted our study population.

In the present study, the most common maternal factors were gestational diabetes mellitus (GDM), hypertension, and anaemia in pregnancy. The most common foetal factors were not well understood. However, in six foetuses, we

Table 1: Demographic details of the study population	
Age	Number of IUFDs
20 – 24	12
25 – 29	22
30 – 34	24
35 – 39	7
40 AND ABOVE	1
Grand Total	66
BMI	Number of IUFDs
<18.5	8
18.5 - 24.9	36
25.0 - 29.9	14
30.0 - 34.9	6
5.0 – 39.9	2
>40.0	0
Grand total	66
Parity	Number of IUFDs
0	28
1	19
2	13
3	4
4 AND ABOVE	2
Grand total	66
Gestational age	Number of IUFDs
24 -27	04
28-31	15
32-36	24
37-39	18
40 – 41	5
Grand Total	66
IUFD: Intrauterine foetal demise.	

noted that there was a tight loop of umbilical cord around the neck, seven cases had birth asphyxia due to a thick meconium stained liquor (MSL), and five foetuses had gross congenital anomalies. These anomalies include duodenal atresia, Lissencephaly, congenital diaphragmatic hernia, and neural tube defects. A significant number of these patients detected to have gross congenital anomalies in the foetuses presented late to our facility due to movement restrictions and disruptions in healthcare services during the COVID-19 pandemic. Many had already crossed the optimal period for anomaly scanning by the time they sought care. In some cases, patients declined termination of pregnancy despite being

Table 2: Mode of delivery of IUFDs	
Mode of delivery	Number of IUFDs
Spontaneous vaginal delivery	28
Induced vaginal delivery	15
Vaginal delivery after caesarean	7
LSCS	16
IUFD: Intrauterine foetal demise, LSCS: Lower segment cesarean section.	

informed of the anomaly and associated prognosis. Cultural, religious, and personal beliefs influenced these decisions.

Preventing intrapartum stillbirths, particularly those caused by birth asphyxia, requires a comprehensive approach that includes effective prenatal care, monitoring, identifying high-risk factors, and addressing them.

In this study, the majority of the women underwent vaginal delivery either spontaneously or induced, while lower segment cesarean section (LSCS) was performed in 16/66 cases due to factors like prior caesareans, malpresentations, failed inductions, placenta previa, and religious preferences. Each case emphasised individualised care, balancing maternal-foetal safety with clinical guidelines [Table 2].

Among the 66 IUFD cases, 31 were female foetuses, and 20 had a birthweight of more than 2.5 kg. Additionally, 57 were macerated foetuses and nine were fresh stillbirths. These findings provide a detailed breakdown of the characteristics of the IUFD cases, highlighting the varied outcomes in terms of sex, birthweight, and the condition of the foetuses.

More than 35 classifications have been described in the last 50 years. Each system has a different approach to assigning a cause of death.

In our study, we used Re. Co. De. Classification system [Table 3] as it provides a comprehensive approach by considering maternal, foetal, and placental factors, offering reliable classification with good agreement.^[9] It helps identify specific causes of stillbirth, aiding in research and prevention.

DISCUSSION

The analysis of stillbirths occurring over a 6-year period, according to Re. Co. De. Classification showed that 81.82 % of cases of stillbirth could be assigned a relevant condition, leaving 18.18 % as unclassified or unexplained. According to this classification, the highest number of stillbirths in this study was attributed to Group-F: Mother (39.39 %), followed by Group-I: Unclassified (81.82 %), Group A: Foetus (16.66 %), Group-B: Umbilical cord (9.09 %), Group-C: Placenta (6.06 %), Group-D: Amniotic fluid (4.54 %), Group-E:

Table 3: Classification of aetiological factors according to Re. Co. De. classification

Groups	Primary conditions	Secondary conditions										
		No of stillbirth primary conditions	Foetal growth restriction	Abruption	Previa	Oligohydramnios	Polyhydramnios	Diabetes	Essential hypertension	Hypertension in pregnancy	Anaemia	Asphyxia
Group A (Foetus) (16.66%)	A1) Lethal congenital anomaly (7.57%)	5	1	1			3					
	A2) Infections	0										
	A3) Non-immune hydrops	0										
	A4) Iso-immunisation	0										
	A5) Foetomaternal haemorrhage	0										
	A6) Twin-twin transfusion (1.52%)	1										
	A7) Foetal growth restriction (7.57%)	5				2						1
Group B Umbilical cord												
(9.09 %)	B1) Cord prolapse	0										
	B2) Constricting loop or knot (9.09 %)	6				1						5
	B3) Velamentous insertion	0										
Group C (Placenta)												
(6.06%)	C1) Abruptio (6.06%)	4										1
	C2) Previa	0										
	C3) Vasa previa	0										
Group D (Amniotic fluid)												
(4.54%)	D1) Chorioamnionitis	0										
	D2) Oligohydramnios (4.54%)	3										
	D3) Polyhydramnios	0										
Group E (Uterus) (4.54%)	E1) Rupture	0										
	E2) Uterine anomaly (3.03%)	2										
	E3) Obstructed labour (1.51%)	1										1
Group F (Mother) (39.39 %)	F1) Diabetes (15.15%)	10			2	2					3	
	F2) Thyroid disease (3.03%)	2										
	F3) Essential hypertension (3.03%)	2									2	
	F4) Hypertensive disorders of pregnancy (9.09%)	6		1		2					4	
	F5) Antiphospholipid syndrome	0										
	F6) Cholestasis	0										
	F7) Drug misuse	0										
	F8) Infections (3.03%)	2									2	
	F9) Others – Anemia, heart diseases (6.06 %)	4										4
Group G (Intrapartum) (1.54%)	G1) Asphyxia (1.54%)	1										
	G2) Birth trauma	0										
Group H (Trauma) (0%)	H1) External	0										
	H2) Iatrogenic	0										
Group I (Unclassified) (18.18%)	I1) No relevant condition identified (10.6%)	7										
	I2) No information available (7.58%)	5										
Total (100%)		66										

Uterus (4.54 %), Group-G: Intrapartum (1.54 %), and lastly, Group-H: Trauma (0 %).

The largest category of SB belonged to class: F1- Diabetes (15.15%), followed by class: F4 - Hypertensive disorders of pregnancy (9.09%) and class: B2 - Constricting loop or knot (9.09 %).

Information on the classification of a secondary condition was available only in 38 cases. A wide spread of secondary conditions can be observed for several of the primary classifications. In particular, this analysis showed that some proportion of congenital anomalies had polyhydramnios. Within the primary hypertensive disorders of pregnancy (F4), a portion of patients presented with oligohydramnios and anemia, and a few cases resulted in placental abruption. The placental factor studied in most patients showed chronic uteroplacental insufficiency and maternal vascular malperfusion, identified through histopathological examination of the placenta. Intra-partum asphyxia was often a secondary code for stillbirth associated with anaemia, IUGR, constricting loop of cord. Anaemia was often a secondary code for SB associated with diabetes, hypertensive disorders of pregnancy, and infection.

In different Indian states, stillbirths range from 20 to 66 per 1000 live births,^[10] and in our study, the stillbirth rate was comparatively less (5.41%). The lower stillbirth rate in our study could be attributed to easy access to tertiary hospital that serve as main referral units for peripheral hospitals and rural health centres providing free antenatal check-ups, intrapartum and postpartum care, along with the presence of around 4 medical colleges within a radius of approximately 10-15 km from each other.

Bhatia T *et al.*^[11] and Saleem *et al.*, 2018^[12] reported 27.76 stillbirths per 1000 live births. The majority of the stillbirths are seen in other underdeveloped countries, but India still struggles with a higher rate despite improvement in medical care.^[13-15] In our study, a predominant proportion of participants hail from the lower-class socio-economic stratum. The detrimental impact of impoverished socio-economic conditions and increased prevalence of anaemia within this cohort intensifies the predisposition to obstetric complications such as preeclampsia and intrauterine growth restriction (IUGR). This cascade of events escalates the vulnerability to IUFD, emphasising the significance of interrupting this chain for improving pregnancy outcomes. Addressing socio-economic disparities is of paramount importance for preventing adverse pregnancy outcomes.

IUFD rates were greater in primigravidas, unlike other studies by Bhatia *et al.*^[11] and Gupta *et al.*^[20] which experienced IUFD in higher birth orders. Bateman and Simpson (2006) reported higher stillbirth rates among teenagers and women aged 35

and above. In contrast, our study found that the 30–34-year age group had the highest incidence of stillbirths.^[16]

Studies conducted by Gupta *et al.*^[20] Sharma *et al.*,^[19] found that 90% of unbooked women contributed to a higher stillbirth rate. However, the statement contrasts with the findings of our study, where most women were booked but had irregular ANC follow-ups. This suggests that even though the women were initially registered for prenatal care, they did not adhere to the recommended schedule of follow-up visits at our hospital, which may have also contributed to adverse outcomes such as stillbirths.

In our study, gestational diabetes mellitus and pregnancy-induced hypertension contributed to 27 % cases of intra-uterine death. This was quite similar to the study by Uma Jain *et al.*^[21] where unexplained stillbirth was seen in 11.9% patients with GDM. Similarly, in a study by Kumar *et al.*,^[17] hypertensive disorders of pregnancy contribute to 16.39% of deaths. A meta-analysis report indicates that congenital malformations account for 6% of stillbirths in India.

Uncontrolled Gestational Diabetes Mellitus can independently contribute to IUFD by increasing the risk of complications such as macrosomia (large birth weight), placental abnormalities, foetal hypoxia, and metabolic imbalances, highlighting the need for careful monitoring and management of GDM during pregnancy to reduce the incidence of stillbirth.^[18] The findings from our study emphasise the importance of consistent antenatal visits for the early detection of potential complications and timely interventions to prevent adverse obstetric outcomes.

Our study reveals that a significant proportion of stillbirths remain unexplained, emphasising the need for comprehensive investigations, including foetal autopsy. The findings highlight the critical role of multidisciplinary collaboration involving obstetricians, paediatricians, radiologists, pathologists, geneticists, and other paramedical support staff in addressing adverse perinatal outcomes. Collaboration among these specialists is essential for comprehensive care and effective prevention strategies. Preconception care and early detection of risk factors such as maternal diseases, congenital malformations, and IUGR are crucial for planning subsequent management steps. Insufficient prenatal care, low socio-economic status, and diverse pregnancy complications underscore the need for holistic improvements in maternal and neonatal healthcare provision. Referring mothers to tertiary care centres for the management of prematurity and other obstetric and medical complications is essential.

Strengths of the study

The study highlights regional disparities in stillbirth rates across India and identifies high-risk groups. It offers valuable

insights for targeted interventions and improved prenatal care. The findings can help policymakers frame new policies aimed at reducing stillbirths in both India and globally.

Limitations

A significant limitation of this study is the reluctance of people in this region to consent to the autopsies of fetuses and karyotyping of both foetus and parents following an incidence of IUD and suspected genetic aetiology, owing to deeply held religious convictions. This limitation restricts the availability of crucial diagnostic information that could provide insights into the underlying causes of stillbirths in the population under study. Without comprehensive autopsy and genetic testing data, the study may lack a deeper understanding of the contributing factors to stillbirths, potentially leading to incomplete or inaccurate conclusions regarding the aetiology of these adverse pregnancy outcomes.

CONCLUSION

IUFD and stillbirths in a fast-growing developing country, such as India, are indicative of a lack of awareness about nutrition, the need for regular antenatal check-ups, and a lack of healthcare in remote regions. Healthcare programs do cater to the health of the mother and unborn child, but need to be improved to reduce the incidence of unforeseen IUFD. Community-level awareness programs and targeted campaigns highlighting government policies for free antenatal care and deliveries are essential for promoting service uptake and preventing adverse outcomes in antenatal care.

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Ethical approval: The research/study approved by the Institutional Review Board at K S Hegde Medical Academy, NITTE (Deemed to be University), number INST.EC/EC/126/2024 and REG NO:EC/NEW/INST/2022/KA/0174, dated 30th March 2024.

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