



A CROSS-SECTIONAL STUDY TO ANALYSE CAUSES AND RISK FACTORS OF INTRAUTERINE FETAL DEATH AT TERTIARY CARE HOSPITAL

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ABSTRACT

Background: Intrauterine fetal death (IUFD) remains a significant contributor to perinatal mortality, particularly in developing countries. Despite improvements in maternal healthcare, the burden of stillbirths continues to be high due to multiple maternal, fetal, and placental factors. Identifying the associated risk factors is essential for improving antenatal care and reducing preventable fetal deaths.

Methods: A cross-sectional clinical study was conducted in the Department of Obstetrics and Gynecology at Geetanjali Medical College and Hospital, Udaipur, after obtaining institutional ethical approval. A total of 64 antenatal patients diagnosed with IUFD were included in the study using a consecutive sampling technique. Data regarding sociodemographic characteristics, obstetric history, clinical presentation, medical disorders, gestational age, mode of delivery, and possible causes of IUFD were collected using a predesigned proforma. Relevant clinical examinations and laboratory investigations were performed. Data were analyzed using Microsoft Excel, and results were expressed as frequency, percentage, mean, and standard deviation.

Results: The majority of patients were aged 26–30 years (39.1%), and 57.8% belonged to lower or lower-middle socioeconomic classes. Most patients were multigravida (60.9%). The most common presenting complaint was abdominal pain (29.7%). The majority of IUFD cases occurred before 38 weeks of gestation. Maternal risk factors included gestational hypertension (9.4%), preeclampsia (7.8%), and hypothyroidism (7.8%). Severe oligohydramnios and preeclampsia were among the most common identifiable causes (9.3% each), while 18.75% of cases remained unexplained. Vaginal delivery with induction was the most common mode of delivery (45.3%).

Conclusion: IUFD is frequently associated with preventable maternal conditions and inadequate antenatal care. Early identification of high-risk pregnancies, regular antenatal monitoring, timely management of complications, and promotion of institutional deliveries are essential to reduce the burden of IUFD.

Keywords: Intrauterine fetal death, Stillbirth, Antenatal care, Risk factors, Perinatal mortality.

INTRODUCTION

Intrauterine fetal death (IUFD) remains a significant public health problem worldwide and continues to contribute substantially to perinatal mortality. Adequate prenatal care plays an essential role in preventing fetal deaths, and studies have shown that mothers who are aware of and receive appropriate antenatal care have lower rates of fetal and neonatal mortality. IUFD and stillbirths are distressing events that cause considerable emotional, psychological, and social impact on parents and families. According to the World Health Organization (WHO), stillbirth is defined as the birth of a baby with no signs of life at or after 28 weeks of gestation, with a birth weight of 1000 g or more or a crown–heel length (CHL) of at least 35 cm.[1]

The prevalence of IUFD reflects the quality of antenatal and obstetric care within a healthcare system. Globally, more than 2.6 million stillbirths occur annually, with nearly two-thirds occurring in developing countries.[2] India accounts for a substantial proportion of these deaths, contributing approximately 23.2% of all IUFD cases worldwide. With an estimated rate of around 14 stillbirths per 1000 live births, India continues to have a high stillbirth burden.[3] Factors such as delayed antenatal registration, limited access to healthcare facilities, inadequate prenatal monitoring, and poor awareness of maternal health significantly contribute to this problem, particularly in resource-limited settings.

Several maternal demographic and clinical factors have been associated with an increased risk of intrauterine fetal death. Advanced maternal age above 35 years, maternal obesity, lack of regular antenatal care, and low socioeconomic status are recognized risk factors.[4] In addition, maternal medical conditions such as hypertension, diabetes mellitus, thyroid disorders, renal disease, cardiac disease, asthma, and thrombophilic disorders may increase the risk of fetal demise by affecting placental function and fetal growth. Prenatal fetal deaths account for nearly 75% of all perinatal deaths. The causes of fetal demise are generally classified into maternal, placental, and fetal factors, contributing approximately 5–10%, 20–35%, and 25–40% of cases respectively. Various classification systems, including the Tulip classification, Extended Wigglesworth classification, and Modified Aberdeen classification, have been developed to categorize these causes. Regardless of the classification system used, early identification of risk factors and timely antenatal care remain essential for improving pregnancy outcomes.[5] Advances in infertility treatment have introduced assisted reproductive technologies (ART), which involve laboratory handling of oocytes or embryos to achieve pregnancy. Although ART procedures are generally considered safe, some studies have reported associations with adverse neonatal outcomes such as low birth weight, preterm birth, congenital anomalies, stillbirths, and infant mortality.[6] The present study aims to analyze the fetomaternal conditions associated with intrauterine fetal death, focusing on clinical presentation, management, and associated risk factors, while also evaluating sociodemographic characteristics and the relationship between assisted reproductive techniques and IUFD.

MATERIALS AND METHODS

After obtaining approval from the Institutional Research Review Committee and the Institutional Ethical Committee, the present study was conducted in the Department of Obstetrics and Gynecology at Geetanjali Medical College and Hospital (GMCH), Udaipur. Written informed consent was obtained from all participants prior to performing ultrasonography (USG) and other necessary investigations.

This was a cross-sectional clinical study conducted among antenatal patients attending GMCH. A total of 64 patients diagnosed with intrauterine fetal death (IUFD) during the study period were included. A consecutive sampling technique was used to recruit eligible participants who fulfilled the inclusion criteria. Patients were included if they had a gestational age greater than 20 weeks, fetal weight greater than 500 g, and maternal age above 18 years. Patients who did not provide consent for participation were excluded from the study.

Data were collected using a predesigned proforma. Information regarding demographic characteristics and menstrual history, including whether menstrual cycles were regular or irregular, was documented. Obstetric details of the current pregnancy were recorded, including chief complaints such as decreased

or absent fetal movements, leaking per vagina, bleeding per vagina, and abdominal pain. The gestational age at the time of diagnosis of IUFD was also noted.

Details regarding previous pregnancies were documented, including the number of normal deliveries, cesarean sections, abortions, and any complications associated with past pregnancies. A detailed medical and surgical history was obtained, along with information regarding previous blood transfusions and drug allergies. The method of conception was also recorded, whether spontaneous or through assisted reproductive techniques.

All patients underwent thorough general and local examinations. Routine laboratory investigations included complete blood count (CBC), blood group and Rh factor, urine examination, HIV, HBsAg, VDRL, random blood sugar, liver function tests (LFT), renal function tests (RFT), and serum thyroid-stimulating hormone (TSH) levels. Additional investigations were performed depending on the clinical condition of the patient. The timing of IUFD, whether during the antenatal or intranatal period, was documented. Management of IUFD was recorded, including the mode of delivery. Vaginal delivery occurred either spontaneously or through induction or augmentation using prostaglandin gel (CP gel) or misoprostol. In selected cases, cesarean section was performed, and the indication for surgery was noted. Following delivery, fetal details such as birth weight, congenital anomalies, and evidence of infection or sepsis were documented. The probable cause of IUFD was determined based on clinical findings and investigations.

Data entry and statistical analysis were performed using Microsoft Excel. Qualitative variables were expressed as frequency and percentage and presented using bar charts and pie diagrams. Quantitative variables were expressed as mean and standard deviation, and histograms were used for graphical representation.

RESULTS

A total of 64 patients with intrauterine fetal death (IUFD) were included in the present study. The demographic characteristics, obstetric profile, maternal risk factors, mode of delivery, and causes of IUFD were analyzed.

The majority of study participants were in the 26–30 years age group (39.1%), followed by 20–25 years (26.6%) and 31–35 years (23.4%). Only 11% of participants were above 35 years of age. Regarding socioeconomic status, 40.6% belonged to the middle class, while 57.8% belonged to the lower and lower-middle socioeconomic groups. In terms of antenatal care, 70.3% of patients were registered cases, whereas 29.7% were unregistered. [Table 1]

Table 1. Socio-demographic characteristics of study participants (n = 64)

Variable	Category	No.	%
Age group (years)	20–25	17	26.6
	26–30	25	39.1
	31–35	15	23.4
	36–40	4	6.3
	>40	3	4.7
Socioeconomic status	Lower	19	29.7
	Lower-middle	18	28.1
	Middle	26	40.6
	Upper	1	1.6
Booking status	Registered	45	70.3
	Unregistered	19	29.7

Most patients were multigravida (60.9%), while 39.1% were primigravida. The most common presenting complaint was pain in abdomen (29.7%), followed by leaking per vagina, decreased fetal movements, and routine check-up (15.6% each). The majority of IUFD cases occurred before term,

with 50% occurring between 31–38 weeks and 43.75% between 24–30 weeks, whereas only 6.25% occurred after 38 weeks of gestation. [Table 2]

Table 2. Obstetric and clinical characteristics of study participants (n = 64)

Variable	Category	No.	%
Obstetric history	Primigravida	25	39.1
	Multigravida	39	60.9
Chief complaints	Pain in abdomen	19	29.7
	Leaking per vagina	10	15.6
	Decreased fetal movements	10	15.6
	Routine check-up	10	15.6
	Bleeding per vagina	6	9.4
	Headache	5	7.8
	Spotting per vagina	2	3.1
	Breathlessness	1	1.6
	Weakness	1	1.6
Gestational age (weeks)	24–30	28	43.75
	31–38	32	50
	>38	4	6.25

Most participants (64.1%) had no significant past medical history. Among the medical conditions identified, gestational hypertension (9.4%), hypothyroidism (7.8%), and preeclampsia (7.8%) were the most common. A small proportion of participants reported smoking (4.7%), tobacco chewing (1.6%), and alcohol consumption (12.5%). [Table 3]

Table 3. Maternal medical and personal history of study participants (n = 64)

Variable	Category	No.	%
Past medical history	None	41	64.1
	Gestational HTN	6	9.4
	Hypothyroidism	5	7.8
	Preeclampsia	5	7.8
	GDM	2	3.1
	Heart disease	3	4.7
	Thrombocytopenia	1	1.6
	Tuberculosis	1	1.6
Smoking	Yes	3	4.7
	No	61	95.3
Tobacco chewing	Yes	1	1.6
	No	63	98.4
Alcohol intake	Yes	8	12.5
	No	56	87.5

Vaginal delivery with induction was the most common mode of delivery (45.3%), followed by vaginal delivery without induction (29.7%) and cesarean section (21.9%). Among cesarean deliveries, failed induction was the most common indication (57.2%). The most frequently identified causes of IUFD were unexplained causes (18.75%), followed by severe oligohydramnios and preeclampsia (9.3% each). Other contributing factors included gestational hypertension, congenital anomalies, IVF conception, and cord abnormalities. [Table 4]

Table 4. Mode of delivery and causes of intrauterine fetal death (n = 64)

Variable	Category	No.	%
Mode of delivery	Vaginal delivery with induction	29	45.3
	Vaginal delivery without induction	19	29.7
	LSCS	14	21.9
Indications for LSCS (n = 14)	Acceleration of labour	2	3.1
	Failed induction	8	57.2
	Abruptio placenta	2	14.3
	Placenta increta	2	14.3
	APH	1	7.1
	Previous CS with failed induction	1	7.1
Major causes of IUFD	Unexplained	12	18.75
	Severe oligohydramnios	6	9.3
	Preeclampsia	6	9.3
	Gestational HTN	3	4.6
	Congenital anomaly	3	4.6
	IVF conceived	5	7.8
	Cord abnormalities	3	4.7

DISCUSSION

Intrauterine fetal death (IUFD) remains a major public health concern, particularly in developing countries. Although antepartum fetal deaths have declined in developed nations due to improved antenatal surveillance and obstetric care, they continue to pose a significant challenge in low- and middle-income countries, especially in South Asia. Identification of the underlying causes of fetal death is essential for effective counseling, prevention, and improved clinical management. Despite the overall decline in perinatal mortality, the reduction in fetal deaths has been relatively slower compared to neonatal mortality, highlighting the need to better understand the associated determinants and risk factors.

The present study was conducted to analyze the fetomaternal conditions associated with IUFD, focusing on clinical presentation, maternal risk factors, and management outcomes. In this study, among 64 women with IUFD, 22 (34.4%) were above 30 years of age. Advanced maternal age has been recognized as an important risk factor for adverse pregnancy outcomes, including fetal death. In comparison, Thakur A et al. reported a mean maternal age of 26.22 ± 5.67 years, with most cases being preterm (53.3%).[7] Similarly, Garg S et al. observed that 76.25% of patients were between 21 and 30 years of age, while 18.75% were above 30 years.[8] Other studies have also reported that maternal age above 35 years is associated with an increased risk of fetal mortality.[9]

Socioeconomic status is another important factor influencing pregnancy outcomes. In the present study, more than half of the participants (57.8%) belonged to lower and lower-middle socioeconomic classes. Poor socioeconomic status is often associated with inadequate nutrition, limited access to healthcare services, and poor awareness regarding maternal health. Similar findings were reported by Suganthi, who observed that more than two-thirds of study participants belonged to lower socioeconomic groups.[10]

Antenatal care is an important determinant of pregnancy outcomes. In the present study, a notable proportion of cases were unregistered, emphasizing the importance of regular antenatal check-ups. Meharunnissa Khaskheli reported that nearly 94% of IUFD cases were unbooked and referred from rural areas with pregnancy complications.[11] Similarly, Thakur A et al. found that IUFD was more common among unbooked patients.[7] Audu et al. also reported a higher incidence of IUFD among unbooked cases (57.5%) compared with booked patients (42.5%).[12] Rehan N reported that approximately 85% of stillbirths occurred in unbooked pregnancies, whereas only 14.9% occurred in booked cases.[13] Likewise, a study conducted in a Nigerian teaching hospital reported that 55.7% of

stillbirths occurred among unbooked patients.[14] These findings highlight the critical role of adequate antenatal care in reducing fetal mortality.

Maternal medical disorders are also important contributors to fetal demise. In the present study, hypertension was observed in 9.4% of patients, while hypothyroidism and preeclampsia were present in 7.8% each. However, nearly 60% of cases had no identifiable risk factors. Thakur A et al. reported that approximately 26.31% of IUFD cases had no identifiable risk factors.[7] Similarly, Shabaan et al. reported no risk factors in 28.8% of cases.[15] Kuti O et al. observed that nearly 40% of antepartum fetal deaths occurred without a known cause.[14] Singh N et al. also reported unexplained etiology in 33.44% of IUFD cases.[16] Likewise, SR Shrestha et al. reported that unexplained stillbirths accounted for about 18% of cases, with hypertension being the most common identifiable risk factor.[17] Several maternal complications have been associated with IUFD in previous studies. Shabaan et al. reported hypertension as the most common risk factor (29.3%), followed by placental abruption (14%).[15] Kuti et al. observed antepartum hemorrhage (20%) as the leading risk factor, followed by hypertension (11.4%).[14] Imtiaz et al. also identified antepartum hemorrhage as a major contributor.[18] In contrast, Singh N et al. reported severe anemia as the most common risk factor.[16] In the present study, severe oligohydramnios and preeclampsia were identified in 9.3% of cases each, while gestational hypertension was observed in 4.6%. Additionally, 7.8% of cases were associated with pregnancies conceived through in vitro fertilization (IVF), suggesting that both maternal disorders and assisted reproductive techniques may influence pregnancy outcomes.

Gestational age is another important factor affecting fetal survival. Previous studies have shown that IUFD occurs more frequently in preterm pregnancies. Thakur A et al. reported a higher incidence of IUFD among preterm fetuses.[7] Similarly, Shrestha SR reported that about 40% of stillbirths occurred in preterm pregnancies.[17] Pakistani research found that 49% of stillbirths occurred in preterm pregnancies and 51% at term.[19] In contrast, Singh N et al. reported that 64.18% of IUFD cases occurred between 37 and 40 weeks of gestation, while 31.07% occurred in preterm pregnancies.[16]

In the present study, the majority of patients (60.9%) were multigravida. However, Thakur A et al. reported that 50.3% of IUFD cases occurred in primigravida women.[7] Similarly, Tamrakar SR reported a higher incidence of IUFD among primiparous women.[20] In contrast, Audu B et al. found that multiparous women were nearly twice as likely to experience IUFD compared with primiparous women.[21]

Regarding the mode of delivery, most women (78.1%) in the present study delivered vaginally, while 21.9% underwent lower segment cesarean section (LSCS), mainly due to failed induction. Similar findings were reported by Thakur A et al., where 82.2% of women delivered vaginally and 13.8% underwent cesarean section.[7] Singh N et al. reported that 11.48% of IUFD cases required cesarean section due to indications such as placenta previa, transverse lie, previous cesarean section, or obstructed labor.[16] Imtiaz et al. also reported cesarean delivery in about 14% of stillbirth cases.[18] However, the findings of this study should be interpreted considering certain limitations. As this was a single hospital-based study, the results may not be generalizable to the wider population. Furthermore, autopsy, cytological examination of fetal tissues, and placental histopathology were not performed due to financial constraints, which may have limited accurate identification of some causes of IUFD.

CONCLUSION

Intrauterine fetal death remains a significant contributor to perinatal mortality, particularly in developing regions. The present study highlights that several IUFD cases are associated with preventable maternal conditions such as hypertension and severe oligohydramnios. Early identification of high-risk pregnancies through regular antenatal care, timely diagnosis of complications, and appropriate management can significantly reduce fetal deaths. Strengthening health education, improving access to antenatal services, and promoting institutional deliveries are essential steps to reduce preventable IUFD. Early ultrasound screening and careful intrapartum

monitoring can further aid in early detection of fetal compromise. Addressing maternal risk factors and improving healthcare awareness can contribute to reducing the overall burden of IUFD.

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