

THE PROFILE OF MATERNAL AND FOETAL FACTORS OF INTRAUTERINE FOETAL DEATH

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ABSTRACT

Background: Intrauterine fetal death (IUFD) is a major contributor to perinatal mortality and remains a distressing event for families and clinicians, particularly in low-resource settings where many deaths are preventable. IUFD is commonly defined in the Indian context as fetal death beyond 28 weeks of gestation or with birth weight ≥ 1000 g. The burden of stillbirths is disproportionately high in developing countries, where intrapartum deaths due to avoidable factors remain common despite advances in obstetric care. **Materials and Methods:** A cross-sectional study was conducted in the Department of Obstetrics and Gynaecology, Regional Institute of Medical Sciences (RIMS), Imphal, Manipur, over a two-year period from October 2012 to October 2014. All pregnant women with IUFD beyond 28 weeks of gestation and/or birth weight ≥ 1000 g admitted during the study period were included ($n = 100$). Data on sociodemographic variables, obstetric history, antenatal care, clinical findings, mode of delivery, fetal characteristics, and placental/cord abnormalities were collected using a predesigned proforma. Relevant laboratory investigations and ultrasonography were performed. Stillbirths were classified as fresh (intrapartum) or macerated (ante partum). Statistical analysis was done using the chi-square test. **Result:** During the study period, there were 22,853 deliveries and 403 stillbirths, giving a stillbirth rate of 17.6 per 1000 births. Among the 100 analyzed cases, 48% were fresh and 52% macerated stillbirths. Significant determinants of stillbirth included unbooked antenatal status, rural residence, maternal anemia, blood pressure $\geq 140/90$ mmHg, low educational status, advanced maternal age, higher parity, prematurity, and very low birth weight. Anemia and pregnancy-induced hypertension were the most frequent associated medical conditions. Common obstetric factors were preterm and mismanaged labour, obstructed labour, antepartum haemorrhage, cord complications, placenta praevia, breech presentation, and premature rupture of membranes. Antepartum anoxia (due to haemorrhage and anemia) and intrapartum asphyxia (due to cord complications and prolonged/obstructed labour) appeared to be the likely mechanisms of fetal death. **Conclusion:** Despite modern obstetric advances, many stillbirths in this setting were linked to preventable or manageable conditions. Strengthening antenatal care, early detection of high-risk pregnancies, timely referral, improved intrapartum monitoring, emergency obstetric care, and enhancement of female literacy and health education are essential to reduce the stillbirth burden.

INTRODUCTION

Intra uterine fetal death is a distressing situation for the obstetrician and a catastrophic loss to both family and society which occurs in about 1% of all pregnancies.^[1]

World Health Organization (WHO) defined intra uterine fetal death as fetal loss in pregnancies beyond 20 weeks of gestation or if the gestational age is not known, a birth weight of 500 gm or more which corresponds to 22 weeks of gestation in a normally developing fetus.^[2]

For International comparison and Indian setup intra uterine fetal death is defined as fetal death in the third trimester beyond 28 completed weeks of gestation or $\geq 1000\text{gm}$ birth weight.^[3] With advances in obstetric, clinical genetics, maternal / foetal, neonatal medicine and prenatal pathology a number of still births which has previously been categorized as unexplained can be attributed to specific cause. An advantage of the common use of ultrasound technology is the case with which the suspicion of fetal death is confirmed.^[4]

Nearly 60% of the perinatal deaths are still births.^[5] Unexplained antepartum still births are now a major contributor to perinatal mortality in developed countries. In the developing countries, the bulk of intrauterine foetal death are intrapartum and attributed to common avoidable factors.^[6] Worldwide an estimate of at least 3.2 million stillbirths occurs each year. The majority of these deaths occur in developing countries. In developed countries approximately 1 in 200 pregnancies ends in still births.^[7-9]

Although sophisticated perinatal diagnostics and better intra partum monitoring has fortunately reduced the incidence each year about 8 million perinatal deaths occur predominantly (98%) in developing countries. In recent years, the etiological determinants of stillbirths and early neonatal deaths have diverged sharply than the similarities existing among the two. Stillbirths are often associated with severe maternal, placental or fetal abnormalities. Maternal smoking, advanced maternal age, high parity and obesity are widely recognized as maternal contributing factors, whereas congenital anomalies, intrauterine growth retardation, cord complications and infections are the common fetal causes of antepartum stillbirths.^[10,11]

Intrapartum fetal death is usually the result of fetal distress or obstructed labour and reflects poor quality of clinical care. Majority of stillbirths (85-90%) in developed countries occur before the onset of labour, whereas this proportion is much lower and overall incidence of stillbirth is much higher in developing countries.^[12,13] Although the overall perinatal mortality has decreased in past three decades, the number of stillbirth is still higher as compared to that of early neonatal deaths. Numerous studies have been carried out with the aim of identifying the epidemiology, risk factors and streamlining the preventive and management protocols. Despite efforts to identify the etiological factors of stillbirths, a substantial part of foetal deaths is still labelled as unexplained intrauterine foetal death. The reduction of intrapartum still births to 10% or less of all late fetal death is credited to the availability of trained birth attendants supported by skilled obstetricians, advanced medical technology and specialized institutional facilities.

The aim of antenatal care is to promote health and wellbeing of the pregnant woman and her fetus through quality prenatal care. Such care entails appropriate recognition and treatment of

complications, supervision of their labour and delivery, ensuing care of their newborn and management of the puerperium to include follow up care that promotes health and provides family planning options.

Patients who have had still births are very apprehensive and require special care to prevent a recurrence wherever possible. Inability to attend antenatal clinics regularly and timely admission account for large number of fresh still births in peripheral hospitals. Interestingly in spite of modern facilities and advances many times, number of contributing factors cannot be derived.

The study was carried out to analyze the causes of perinatal deaths and to find out different ways and means to reduce not only the perinatal death but also long term sequelae affecting the newborns in later life.

Aims and Objects

To determine the incidence of stillbirth in RIMS, Hospital.

To assess the associated risk factors of stillbirth.

To find out ways and means for preventing and reducing stillbirth rate.

MATERIALS AND METHODS

Study design: Cross sectional study

Study variables: Age, gravida, parity, period of gestation, socioeconomic status, literacy, type and mode of delivery, sex and birth weight, fresh or macerated babies, placental and cord findings, blood tests and ultrasonography findings etc.

Statistic analysis: Statistic analysis was done by using chi-square test.

Study set up: The study was carried out in the Department of Obstetrics & Gynaecology of Regional Institute of Medical Sciences, Imphal.

Study duration: The data were collected for two calendar years with effect from the month of October, 2012 to 2014.

Study Population: All pregnant women with intra uterine foetal death beyond 28 weeks of gestation admitted in antenatal ward of RIMS hospital during the tenure of study were taken.

Sample size: 100 cases of intrauterine foetal deaths.

Inclusion criteria

All pregnant women with intra uterine foetal death beyond 28 weeks of gestation and birth weight $\geq 1000\text{ gm}$.

Exclusion criteria

All pregnant women with intra uterine foetal death ≤ 28 weeks of gestation and birth weight $\leq 1000\text{ gm}$.

Methods: Women fulfilling the inclusion criteria were counseled and informed consent was obtained. A detailed history was recorded, including age, address, literacy, socio economic status, gravida, parity, gestational age, booking status, antenatal visits, menstrual and obstetric history, and history of loss of fetal movements. Clinical diagnosis of intrauterine fetal death was made based on history

and examination and confirmed by ultrasonography. Routine investigations (blood group and Rh typing, urine analysis, haemogram, liver and renal function tests, coagulation profile, blood sugar, VDRL/RPR, TORCH, antiphospholipid antibodies, and HIV testing at PPTCT centre) were performed, with additional tests (Widal, malaria, urine culture) as indicated. After evaluation, labour was induced. Details of labour, intrapartum complications, mode of delivery, sex and birth weight of the fetus, and classification into fresh or macerated stillbirth were documented, along with examination for congenital anomalies, cord, and placental abnormalities. All data were recorded in a predesigned proforma and analyzed statistically. Institutional ethics approval and informed consent were obtained. During the two year study period, 22,853 deliveries and 403 stillbirths were recorded, giving a stillbirth rate of 17.6 per 1000 births.

RESULTS

Among the 100 stillbirths, most women were from rural areas (71%), where fresh stillbirths slightly predominated (52.1%), while urban women (29%) had a higher proportion of macerated deaths (62.1%). Illiterate mothers contributed 26% of stillbirths and showed a predominance of fresh stillbirths (65.4%), whereas macerated stillbirths were more frequent among women educated up to matric level (61.7%) and among graduates and above (75%), although numbers were small in the latter group. The highest proportion of stillbirths was observed in the 30–35 year age group (32%), in which macerated deaths predominated (62.5%), while younger mothers (<25 years) and those aged 36–40 years had a slightly higher proportion of fresh stillbirths. [Table 1]

Stillborn babies were more prevalent in the rural population with less education. Stillbirth rate increases as maternal age advances. Most of the stillbirth babies were male.

χ^2 -test is applied in order to know the significant association of stillbirth with booking status. Here $p < 0.01$, it is highly significant and hence stillbirth has significant association with booking status i.e. unbooked has more chance of having stillbirth. Stillbirth rate were higher in unbooked cases. The patterns were same in both macerated and fresh stillborn cases. [Table 2]

Among preterm stillbirths, the majority occurred in fetuses weighing ≤ 1.5 kg (38 cases), followed by 1.6–2.5 kg (21 cases), while only 5 cases were in the 2.6–4 kg group. Fresh stillbirths slightly predominated in the ≤ 1.5 kg preterm group (20/38, 52.6%), whereas macerated stillbirths were marginally more frequent in the 1.6–2.5 kg preterm group (11/21, 52.4%). In preterm fetuses weighing 2.6–4 kg, fresh stillbirths were more common (3/5, 60%), suggesting substantial intrapartum loss in this subgroup. Among term stillbirths, most babies

weighed 2.6–4 kg (19 cases), followed by 1.6–2.5 kg (13 cases), while only 4 term stillbirths occurred in fetuses ≤ 1.5 kg. In term fetuses 1.6–2.5 kg, macerated stillbirths predominated (9/13, 69.2%), whereas in the 2.6–4 kg term group, fresh and macerated stillbirths were nearly equally distributed (10 vs 9 cases). [Table 3].

There was an inverse relationship between level of haemoglobin and frequency of stillbirths. With decreasing haemoglobin level there was an increase in stillbirth rate and this trend was found statistically significant. [Table 4].

A markedly higher stillbirth rate was observed among mothers with hypertension (BP $\geq 140/90$ mmHg) compared to normotensive mothers: BP $< 140/90$: 310 stillbirths out of 20,673 births (1.4%), BP $\geq 140/90$: 93 stillbirths out of 2,180 births (4.2%). This indicates approximately a threefold increase in stillbirth risk in hypertensive pregnancies. [Table 5].

The highest number of stillbirths was observed in the 31–35 year age group (32%), followed by 26–30 years (20%) and 21–25 years (19%). The least number of cases occurred in mothers aged > 40 years (2%). P value is not significant which could be because of the small sample size. [Table 6]

Parity showed a clear rise in stillbirth incidence with increasing birth order, from 1.1% in primipara to 6.6% in women with parity ≥ 5 , indicating high parity as an important risk factor. The proportions of fresh and macerated stillbirths within each parity group were similar, and the association between parity and type of stillbirth was not statistically significant ($p = 0.795$), suggesting that higher parity increases overall stillbirth risk but does not specifically favour antepartum or intrapartum deaths [Table 7]

Stillbirth rate was highest among vaginal deliveries followed by breech vaginal deliveries and the least was seen among ventouse. Fresh stillborn were more common in breech and caesarean unlike in vaginal and instrumental delivery where macerated babies were more common. Out of 12 caesarian sections 7 cases were referred from outside. [Table 8].

The important associated conditions were anaemia, PIH or pre-eclamps maternal pyrexia, UTI and diabetes mellitus is shown in the table. Anaemia and hypertension were quite prevalent in both the group. [Table 9]

Many causes were overlapping. The most common reason prematurity with one or other causes. Apart from prematurity, as and unexplained were also important causes. The important obst events were accidental haemorrhage, placenta praevia, prolonged obstructed labour, premature rupture of membrane (PROM) and complications. Prematurity, APH, Prolonged and mismanaged major Obstetrical problems in both the group. [Table 10]

This table shows that prematurity and birth asphyxia was the common causes of stillbirth. In a significant number of cases causes of stillbirth were unknown.

Many causes were overlapping. The most common reason was prematurity with one or other causes. Apart from prematurity asphyxia and unexplained were also important causes. Some unusual reasons

were anaphylactic drug reaction in one case in the study where foetal loss occurred before starting cesarean operation. [Table 11].

Table 1: showing relation of stillbirth, residence, and maternal age

Characteristics	Macerated Stillbirth, n = 52 (%)	Fresh stillbirth, n = 48 (%)	Total
Urban	18 (62.1%)	11 (37.9%)	29
Rural	34 (47.9%)	37 (52.1%)	71
Illiterate	9 (34.6%)	17 (65.9%)	26
Under Matric	29 (61.7%)	18 (38.3%)	47
Under Graduate	8 (42.1%)	11 (57.9%)	19
Graduate & above	6 (75%)	2 (25%)	8
Age <20	8 (44.4%)	10 (55.6%)	18
Age 20–25	9 (47.9%)	10 (52.6%)	19
Age 26–30	11 (55.0%)	9 (45.0%)	20
Age 30–35	20 (62.5%)	12 (37.5%)	32
Age 36–40	3 (33.3%)	6 (66.7%)	9
Age >40	1 (50%)	1 (50%)	2

Table 2: Booking status of stillbirths

Status	Fresh	Macerated	Total	p-value
Booked	5 (13.9%)	31 (86.1%)	36	0.000 < 0.01
Unbooked	43 (67.2%)	21 (32.8%)	64	

Table 3: Distribution of stillbirths by residence

Baby wt. (kg)	Preterm <37 weeks Macerated	Preterm <37 weeks Fresh	Preterm Total	Term (37–42 weeks) Macerated	Term Fresh	Term Total
1.5 & below	18 (47.3%)	20 (52.6%)	38	2 (50%)	2 (50%)	4
1.6–2.5	11 (52.4%)	10 (47.6%)	21	9 (69.2%)	4 (30.8%)	13
2.6–4	2 (40%)	3 (60%)	5	10 (52.6%)	9 (47.4%)	19

Table 4: Haemoglobin % among expectant mother with stillborn

Level of Hb (g/dl)	Fresh	Macerated	Total Stillbirths	p-value
≤6.5	2 (66.7%)	1 (33.3%)	3	0.003 < 0.05
6.6–8	10 (26.3%)	28 (73.7%)	38	
8.1–10	24 (64.9%)	13 (35.1%)	37	
>10	12 (52.2%)	10 (47.8%)	22	

Table 5: Distribution by level of blood pressure

B P	Total births	Fresh	Macerated	Total
<140/90	310/20,673 (1.4%)	33 (45.2%)	40 (54.8%)	76 (14.9)
≥140/90	93/2,180 (4.2%)	15 (55.6%)	12 (44.4%)	24 (42.1)

Table 6: Distribution by maternal age.

Maternal Age (yr)	Fresh	Macerated	Total Stillbirths	p-value
<20	10 (55.6%)	8 (44.4%)	18	0.65
21–25	10 (52.6%)	9 (47.4%)	19	
26–30	9 (45.0%)	11 (55.0%)	20	
31–35	12 (37.5%)	20 (62.5%)	32	
36–40	6 (66.7%)	3 (33.3%)	9	
>40	1 (50.0%)	1 (50.0%)	2	

Table 7: Distribution of stillbirth by parity

Parity	Total births (%)	Fresh	Macerated	Total	p-value
P1	119/10740 (1.1%)	21 (45.7%)	25 (54.3%)	46	0.795
P2	107/6307 (1.7%)	16 (55.2%)	13 (44.8%)	29	
P3	57/3153 (1.8%)	4 (40.0%)	6 (60.0%)	10	
P4	52/1485 (3.5%)	2 (33.3%)	4 (66.7%)	6	
P ≥5	68/1028 (6.6%)	5 (55.6%)	4 (44.4%)	9	

Table 8: Distribution of stillbirths by mode of delivery

Delivery	Total del. (%)	Fresh	Macerated	Total	p-value
Vaginal	267/14056 (1.8%)	29 (42.6%)	39 (57.3%)	68	0.195
V. Breech	59/297 (19.8%)	10 (66.7%)	5 (33.3%)	15	
V. Ventouse	28/2102 (1.3%)	1 (9.6%)	4 (3.8%)	5	
Caesarean	49/6398 (1.2%)	8 (9.7%)	4 (2.7%)	12	

Table 9: Condition associated with stillbirth

Condition	Macerated	Fresh	Total
PIH	12	15	27
Anaemia	47	30	77
Diabetes	1	1	2
Pyrexia	3	2	5
SLE	1	-	1
Jaundice	1	1	2
UTI	1	3	4

Table 10: Obstetrical events associated with stillbirths

Obstetrical events	No of cases		Total
	Macerated	Fresh	
Accidental Haemorrhage	9	10	19
Placenta Pravia	4	7	11
Hand Prolapse	1	0	1
Cords Complications	5	4	9
Mismanaged labour	18	12	30
Preterm	20	23	43
Breech	5	10	15
Prom	4	7	11
Transverse lie	1	0	1

Table 11: Probable causes of stillbirth

Sl no	Causes	Macerated	Fresh	Total
1	Preterm	20	21	41
2	Asphyxia	9	21	30
3	Unexplained	11	9	20
4	Congenital anomalies	2	6	8
5	High fever	2	3	5
6	Diabetes Mellitus	2	1	3
7	Drug reaction	0	1	1

DISCUSSION

In this hospital-based cross-sectional study of 100 intrauterine fetal deaths, the stillbirth rate and pattern of risk factors highlight the continuing burden of preventable perinatal loss in a low-resource setting. The overall stillbirth rate was higher than that reported from many high-income countries, but comparable to rates from other low- and middle-income regions where gaps in antenatal and intrapartum care persist. The distribution of fresh and macerated stillbirths, with almost equal proportions, suggests a substantial contribution from both antepartum and intrapartum factors. The predominance of macerated deaths in several maternal subgroups indicates missed opportunities for early detection of fetal compromise, whereas the high proportion of fresh stillbirths among selected high-risk groups points to deficiencies in intrapartum monitoring and timely obstetric intervention.

Sociodemographic characteristics such as rural residence and low educational status emerged as important correlates of stillbirth. Rural women not only contributed the majority of cases but also showed a slightly higher proportion of fresh stillbirths, consistent with delays in reaching appropriate facilities, limited availability of skilled birth attendants, and poor access to emergency obstetric care. Similar associations between rural residence, health system barriers, and adverse perinatal outcomes have been demonstrated in large

population-based analyses from low- and middle-income countries, where a significant proportion of stillbirths occur outside adequately equipped facilities. In the present study, illiteracy and low educational attainment were common among mothers with stillbirths, particularly those with fresh intrapartum deaths. This finding aligns with meta-analytic data showing that women with lower levels of education are at substantially higher risk of stillbirth and other adverse perinatal outcomes, largely mediated through poorer health literacy, reduced utilization of antenatal care, and delayed care-seeking.

Maternal age also showed a characteristic pattern, with the highest proportion of stillbirths occurring in women aged 30–35 years and a predominance of macerated deaths in this group. Advanced maternal age, particularly 35 years and above, is an established risk factor for stillbirth, even after adjustment for parity and co-morbidities. Biological mechanisms proposed include a higher prevalence of hypertensive disorders, diabetes, placental insufficiency, and subclinical vascular disease, together with increased chromosomal and structural abnormalities. In this study, the clustering of macerated stillbirths in the 30–35 year age group is consistent with a greater burden of antepartum complications such as anemia, pregnancy-induced hypertension, and antepartum haemorrhage, which were among the leading associated conditions. In contrast, younger mothers and those in the 36–40 year group had a higher proportion of fresh

stillbirths, suggesting that, in these age categories, intrapartum factors such as prolonged or mismanaged labour, obstructed labour, and cord accidents may play a more dominant role.

The analysis of blood pressure and birth weight further supports the contribution of both maternal medical conditions and fetal growth status to stillbirth.^[14-16] Hypertensive women had a stillbirth rate approximately three times higher than normotensive women, with a considerable proportion of fresh intrapartum deaths, in line with previous reports that pregnancy-induced hypertension and pre-eclampsia substantially increase the risk of perinatal mortality, especially when diagnosis and referral are delayed. Low birth weight, particularly ≤ 1.5 kg among preterm fetuses, was strongly associated with stillbirth, reflecting the combined effects of prematurity, intrauterine growth restriction, and underlying placental pathology. At term, however, many stillbirths occurred in normally grown fetuses (2.6–4 kg), underscoring that even apparently appropriate-for-gestational-age babies are vulnerable to intrapartum hypoxia, cord complications, and acute obstetric events when intrapartum surveillance is inadequate.

The relative distribution of fresh and macerated stillbirths across strata of residence, education, age, blood pressure, and birth weight suggests that both “too little, too late” antenatal care and suboptimal intrapartum management contribute substantially to the burden observed in this setting.^[15] International reports emphasise that a large proportion of stillbirths, particularly intrapartum deaths, are preventable through provision of quality antenatal services, timely identification of high-risk pregnancies, effective fetal surveillance, and access to comprehensive emergency obstetric care including caesarean delivery when indicated. In the present context, strengthening routine antenatal screening for anemia and hypertensive disorders, improving referral of high-risk women from peripheral centres, and ensuring continuous intrapartum monitoring with partograph use and timely intervention are likely to yield substantial reductions in stillbirths.^[13] Community-level strategies to enhance female literacy, promote early and regular antenatal attendance, and reduce delays in seeking and reaching care remain equally important in addressing the social determinants identified in this study.

Although the study is limited by its single-centre design and lack of systematic post-mortem or placental histopathology, its strengths include a clearly defined cohort, standardised classification of fresh versus macerated stillbirths, and systematic capture of key maternal and fetal variables.^[14] The findings are consistent with existing literature from similar low-resource settings and reinforce the message that a large proportion of stillbirths in such contexts are potentially avoidable through targeted improvements in antenatal and intrapartum care,

with particular focus on rural, less educated, and older mothers.^[14,15]

CONCLUSION

In this hospital-based cross-sectional study of 100 stillbirths, important sociodemographic differences were observed across residence, maternal education, and age. Rural women accounted for the majority of cases (71%), and fresh stillbirths were slightly more frequent in this group than macerated stillbirths (52.1% vs 47.9%), whereas among urban women, macerated stillbirths predominated (62.1% vs 37.9%). This pattern suggests that rural mothers not only contributed a greater absolute burden of stillbirths, but also experienced a relatively higher proportion of intrapartum fetal deaths, which may reflect delays in accessing skilled obstetric care and emergency services. Maternal educational status also showed notable variation. Illiterate women constituted 26% of cases, and fresh stillbirths were markedly more common in this group (65.4%), while among women educated below matriculation level, who formed the largest educational subgroup (47%), macerated stillbirths predominated (61.7%). Mothers with graduate-level education and above contributed only 8% of stillbirths, although within this small group macerated deaths formed the majority (75%). Lower maternal education has been consistently associated with adverse perinatal outcomes, including stillbirth, likely through reduced health awareness, delayed care-seeking, and poorer utilization of antenatal services. Age-wise, the highest proportion of stillbirths occurred in women aged 30–35 years (32%), followed by those aged 26–30 years (20%) and under 20 years (18%). Macerated stillbirths were especially common in the 30–35 year age group (62.5%), whereas fresh stillbirths slightly predominated in mothers younger than 25 years and in those aged 36–40 years. Advancing maternal age, particularly 35 years or older, is recognized as a risk factor for adverse pregnancy outcomes, including stillbirth, possibly owing to increased prevalence of hypertension, placental insufficiency, and other obstetric complications. These findings underscore the need for strengthened antenatal surveillance and timely intrapartum care, especially among rural, less educated, and older mothers.

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