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Original Research Article

Analysis of the prevalence, etiology, and risk factors of stillbirth from a teaching institute of North Eastern India- a retrospective study

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ABSTRACT

Background: Stillbirth rate is considered a health index. The worldwide stillbirth rate is 18.4/1000 total birth. This study was aimed to evaluate the prevalence and risk factors of intrauterine fetal death in pregnant women in one of the teaching centers in Northeastern India.
Methods: This was a retrospective study. All cases of intrauterine fetal death admitted in the department of obstetrics gynecology of our institute were included over two and half years. Information was gathered from the medical records of the patients and data were analyzed.
Results: During two and half year's period, the total number of deliveries was 2696 and the total numbers of stillbirths were 96, hence the stillbirth rate was 35.6/1000. 93 (96.87%) were antenatal stillbirths and 3 (3.12%) were intrapartum stillbirths. 82 (85.41%) women were unbooked. 85 (90.4%) belonged to low socioeconomic status. 67 (69.79%) were preterm. Maximum 39 (40.62%) belonged to 28-35 weeks of gestational age. The most common cause of Intrauterine death (IUD) was antepartum hemorrhage (17.7%). 14 (14.5%) were abruption and 3 were placenta previa. The second most common cause (14.5%) was the hypertensive disorder of pregnancy.
Conclusions: The stillbirth rate in our institute is higher than the national average. The most common causes of IUD were antepartum hemorrhage, preeclampsia, prematurity, and malpresentation which can be diagnosed and managed by increasing uptake of antenatal care which will lead to timely identification and proper management of maternal and fetal complications eventually reducing the preventable stillbirths.

Keywords: Intrauterine fetal death, Stillbirth, Stillbirth rate, Antenatal care, Perinatal mortality

INTRODUCTION

Stillbirth is one of the common complications of pregnancy but it is least studied. It is traumatic for both mothers as well as obstetricians. It is one of the health care indices which reflects the obstetric care a pregnant woman is receiving. The worldwide stillbirth rate is 18.4/1000 total birth.[1] 98% of these stillbirth occurs in developing countries.[2] About 3.3 million stillbirth occurs in developing countries annually.[2] In developed countries, the stillbirth rate is just 3-5/1000 births while in developing countries it is ten times higher.[3] Lesser number of stillbirths in developed countries is mainly due to adequate antenatal care, availability of optimum intrapartum obstetric care. There are various medical and non-medical causes of IUD. Some events are likely associated with stillbirths but despite performing the placental mhistopathological examination and autopsy, in one forth cases cause cannot be ascertained.[4] This retrospective study was carried out to know the prevalence and to identify the risk factor and causes of stillbirths in the multiethnic population of North Eastern India, as data on IUD are not available from this part of the country.

METHODS

This retrospective study was conducted over two and half years in the department of obstetrics and gynecology of a teaching Institute from northeastern India. We included all cases of intrauterine death which were diagnosed during the antenatal period as well as intrapartum deaths. Intrauterine fetal demise (IUFD) is fetal death that occurs after 20 weeks gestation but before birth. If the gestational age is unknown at the time of death, a fetus that weighs ≥500 g is considered an IUFD. Stillborn babies with a birth weight of less than 500 g were excluded from the study.

As institutes protocol, to find out possible causes and risk factors for stillbirth, maternal details like age, parity, gestational age, antenatal visits, literacy status, socioeconomic status, occupation, medical disorders, and presence of any associated obstetric complications were noted. Obstetric ultrasonography (USG) was performed to know any congenital malformation or any other information like intrauterine growth restriction (IUGR). The mode of delivery, sex, and birth weight of fetuses were noted. The gestational age was assessed from the last menstrual period of the mother and or ultrasonography and clinical examination of the baby.

After delivery, all the fetuses were thoroughly examined for congenital anomalies, each placenta was examined for any abnormality or retro placental clot and sent for histopathological examination. The autopsy was not performed as consent could not be obtained from the parents.

Investigations like complete blood count, blood group and Rh typing, urine routine and microscopic examination, human immunodeficiency virus (HIV), hepatitis B surface antigen (HBsAg), anti-hepatitis C virus (anti-HCV), venereal disease research laboratory (VDRL), glycosylated hemoglobin (Hb), blood sugar, thyroid profile, liver function test (LFT), and kidney function test (KFT) were advised and documented. Special investigations like antiphospholipid antibody (APLA) were done as per case history. The obtained information was analyzed to identify the probable cause of stillbirth.

At the same time, we took equal no of cases of live birth during the same duration and noted presence or absence of various risk factor which can cause this regrettable event. Significance was assessed with all cases of intrauterine device (IUD) with live case with these risk factors.

Statistical analysis

Statistical analysis was performed using the statistical package for the social sciences (SPSS) software package (SPSS for Windows, version 22.0; SPSS, Inc, Chicago, IL, USA). A 95% limit and 5% level of significance were adopted. Therefore, a p value of less than 0.05 was considered significant.

RESULTS

During the study period the total number of deliveries was 2696 and the total number of intrauterine deaths was 96. So stillbirth rate (SBR) in our study was 35.6/1000 births. Out of these 96 stillbirths, 93 (96.87%) were antenatal stillbirths and 3 (3.12%) were intrapartum stillbirths. 82 (87.23%) women were unbooked (Table 1). 86 (90.4%) belonged to low socioeconomic status (Table 1). 67 (69.79%) were preterm and 29 (30.20%) were term pregnancies. Maximum 39 (40.62%) belonged to 28-35 weeks of gestational age. Stillbirth was seen more in female babies. 51 (53.12%) babies were female. Maximum stillbirths (28.12%) were between 1.5-2 kg weights ranges.

Table 1: Different demographic and obstetrics parameters.

Parameters studied	Number of cases (%)
Age of the mother (in years)	
<20	0
20-30	41 (43.6)
30-40	48 (51.06)
>40	5 (5.31)
Parity	
Multigravida	68 (72.3)
Primigravida	26 (27.7)
Socioeconomic status	
Low	85 (90.4)
Middle	8 (9.04)
High	1 (0.53)
Booking status	
Booked	12 (12.7)
Unbooked	82 (87.23)
Gestational age (in weeks)	
<28	13 (13.5)
28-35	39 (40.6)
35-37	15 (15.6)
37-40	22 (22.19)
40-42	0
>42	7 (7.09)
Mode of delivery	
Normal vaginal delivery	68 (72.3)
Assisted breech vaginal delivery	2 (2.1)
Operative vaginal delivery- forceps	4 (4.3)
Operative vaginal delivery- ventouse	1 (1.1)
LSCS	17 (18.1)
Exploratory laparotomy	2 (2.1)
Birth weight (kg)	
<1	11 (11.45)
1-1.5	15 (15.6)
1.5-2	27 (28.12)
2-2.5	17 (17.7)
2.5-3	17 (17.7)
>3	9 (9.3)

68 (72.34%) women were multigravida. 48 (51.06%) women were between 30-40 years of age (Table 1). 75 (79.78%) women were delivered vaginally. 18% delivered by lower segment cesearean section (LSCS) (Figure 1). There were two exploratory laparotomies due to a ruptured uterus. The most common cause (17.7%) of IUD was antepartum hemorrhage (Table 2). 14 (14.5%) were abruption and three were placenta previa. The second most common cause was hypertensive disorders of pregnancy (14.5%). Eclampsia and preeclampsia were present in 6 cases each and gestational hypertension in 2 cases. Malpresentation (11.4%) was the third most common cause. Postdatism was present in 7.29% of cases. Congenital malformation was the next common cause (5.2%). IUGR, diabetes, and heart disease each were 4 (4.16%). Other causes were APLA (2), road traffic accident (1), rupture uterus (2), twins (2), shoulder dystocia (1) obstructed labour (1), severe anaemia (1) and sepsis (1). 20.83% of cases were idiopathic i.e. no cause was found.

We done risk assessment of all cases of IUD with live cases with particular risk factor (Table 3).

Out of 96 cases, we found placental histopathological examination reports in only 29 cases (Table 4). Clinically there were no cases of chorioamnionitis but in histopathological examination of the placenta, chorioamnionitis was present in 7 cases. Chorioangiosis was found in 21 cases, inflammation in 2 cases, and calcification in 2 cases. In the final diagnosis, only 2 cases there were no significant pathology rest 27 cases had ischemia, hypoxia, acute and chronic placental insufficiency. Various high-risk factor present in the live birth group also shown in (Figure 2).

Table 2: Various risk factors and causes of stillbirths.

Causes of IUFD	In IUD cases (%)	In live cases (%)
Antepartum haemorrhage		
Placenta previa	3 (3.12)	10 (10.4)
Abruptio placenta	14 (14.5)	8 (8.69)
Hypertensive disorder		
Gestational HTN	2 (2.03)	2 (2.03)
Pre-eclampsia	6 (6.25)	12 (12.5)
Eclampsia	6 (6.25)	8 (8.69)
Severe anaemia	1 (1.01)	3 (3.12)
Post-dated pregnancy	7 (7.29)	11 (11.45)
Diabetes in pregnancy	4 (4.16)	8 (8.33)
IUGR	4 (4.16)	7 (7.29)
Sepsis	1 (1.01)	1 (1.01)
Heart disease	4 (4.16)	8 (8.69)
Malpresentation		
Breech	5 (5.02)	7 (7.29)
Transverse lie	6 (6.25)	5 (5.20)
Oligohydramnios	1 (1.01)	8 (8.69)
Polyhydramnios	2 (2.03)	3 (3.12)
Congenital anomalies	5 (5.02)	2 (2.03)
Shoulder dystocia	1 (1.01)	1 (1.01)
Obstructed labour	1 (1.01)	4 (4.16)
Rupture uterus	2 (2.03)	0
Road traffic accident	1 (1.01)	0
Idiopathic	20 (20.83)	NA

Table 3: Risk assessment of all cases of IUD with live cases with particular risk factor.

Causes of IUFD	Total IUD cases	Total live cases	
Antepartum haemorrhage			
Placenta previa	3 (3.12)	76	P-0.31, RR-0.50
Abruptio placenta	14 (14.5)	6	P-0.0001, RR-23.275
Hypertensive disorder			
Gestational HTN	2 (2.03)	35	P-0.85, RR-1.56
Pre-eclampsia	6 (6.25)	87	P-0.19, RR-1.9
Eclampsia	6 (6.25)	30	P-0.000, RR-6.48
Severe anaemia	1 (1.01)	18	P-0.67, RR-1.513
Post-dated pregnancy	7 (7.29)	25	P-0.0001, RR-6.6
Diabetes in pregnancy	4 (4.16)	53	P-0.2715, RR-2.053
IUGR	4 (4.16)	28	P-0.0211, RR-3.69
Sepsis	1 (1.01)	3	P-0.25, RR-3.572
Heart disease	4 (4.16)	53	P-0.27, RR-2.053
Malpresentation			
Breech	5 (5.02)	110	
Transverse lie	6 (6.25)	10	P-0.0001, RR-19.189
Oligohydramnios	5 (5.02)	350	P-0.0008, RR-0.071
Polyhydramnios	2 (2.03)	18	P-0.32, RR-2.904
Congenital anomalies	5 (5.02)	21	P-0.0001, RR-5.76
Obstructed labour	1 (1.01)	12	P-0.0428, RR-22.188

Continued.

Causes of IUFD	Total IUD cases	Total live cases	
Rupture uterus	2 (2.03)	1	P-0.0002, RR-14.669
Road traffic accident	1 (1.01)	0	P-0.09, RR-13.88
APLA	1 (1.01)	3	P-0.31, RR-7.228
Renal disease	1 (1.01)	3	P-0.31, RR-7.228
Idiopathic	20 (20.83)	NA	

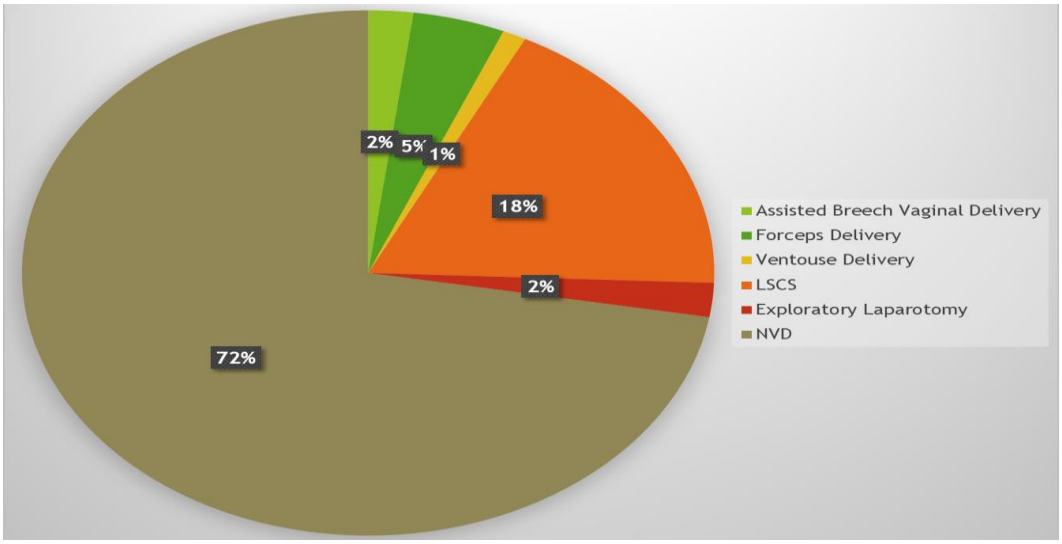

Figure 1: Mode of delivery.

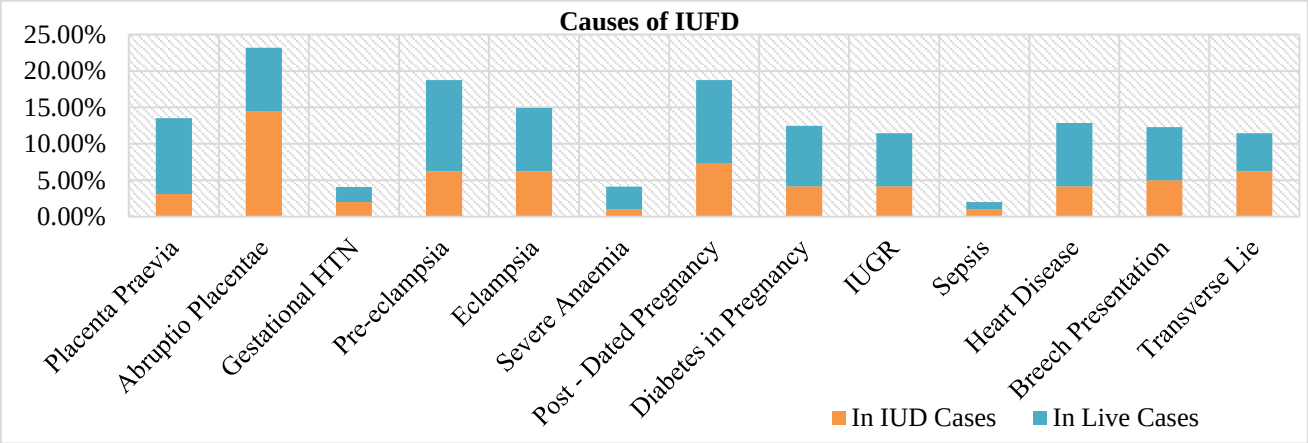

Figure 2: Various risk factor presenting in IUFD and live cases.

Table 4: Placental pathology.

Pathology	Number
Chorioamnionitis	7
Inflammation	2
Chorioangiosis	28
Calcification	2
Acute, chronic ischemia, placental insufficiency	27

DISCUSSION

The SBR in our study was 35.6/1000 births, which is more than the national SBR (18.4/1000 births). Being a tertiary care center we get many referred cases of stillbirth associated with one or more maternal complications. In one retrospective study from north India average SBR of 67.9/1000 birth over a decade (from 2007 to 2016). In the same study also SBR was higher as compared to the national average as the study setting was a tertiary care referral institute.[5]

A similar observation was made by one of the retrospective studies in which the stillbirth rate was 36 per 1000 births.[6] The incidence of stillbirth reported from western countries ranges from 4.7% to 12.0 %.[7-10] However, the incidence rate reported from various centers in India is higher 24.4–41.9%.[11-13] In one study from Taiwan, the overall

incidence for intrauterine fetal demise was 0.98% (121/12,290).[14]

The majority of the cases (96.12%) in our study were antenatal stillbirths (came with a diagnosis of IUD as referred or unbooked) because of good intrapartum care, intrapartum deaths are much lesser. In the present study, 88.54% belonged to low-socioeconomic status. A systematic review of studies from developing countries showed that low socioeconomic status was significantly associated with stillbirth.[15] In the current study, 85.14% of women were unbooked. The low socioeconomic status is associated with poor antenatal care, malnutrition, poor educational status, lack of health awareness, and a combination of all these factors leads to a higher rate of stillbirth. In a study, Neogi documented that 24% of stillbirth and perinatal deaths in South Africa could be prevented annually through increased use of ANC services.[16] In one prospective study from Pakistan which was conducted with middle-class women where health care is accessible SBR was 33.6/1000 births.[17] In contrast to referral institute which caters to women of low-socioeconomic status, SBR was 73.4/1000 births.[18]

Most of the cases of stillbirths were in 30-40 years of age. This observation may be that the maximum number of women were multigravida. It is in contrast to two of the studies from India in which maximum cases were from 20-21 and 24-27 years of age.[5,6] In one study, it was analyzed that maximum stillbirths were in mothers with a parity of 2-4 i.e. 53.12% of women.[19] The study from western countries also mentioned that age more than 35 years of age is associated with stillbirths.[20]

From the Table 3 we can see the risk of having IUD is significant with abruptio ($p<0.0001$), eclampsia ($p<0.0001$, post-datism ($p=0.0001$), congenital anomaly ($p=0.03$), IUGR ($p=0.02$), rupture uterus ($p=0.0002$), malpresentation ($p<0.0001$), oligohydramnios ($p=0.0008$), and obstructed labour ($p=0.04$). But with other risk factors like placenta previa, gestational hypertension, preseclampsia, severe anaemia, diabetes, heart disease, polyhydramnios, sepsis and renal disease only casual association is there as p value is >0.05 and relative risk (RR) is more than one.

In the current study, the most common cause (17.5%) of stillbirth was antepartum hemorrhage (APH). Abruptio was responsible in 14.5% of cases. This in contrast to two other studies where they observed hypertensive disorder of pregnancy was the commonest cause.[5,6] Although the incidence of APH was 18.8% in one of this study.[6]

Nayak et al documented that abruption placenta accounted for 21.9% of total stillbirths.[21] One meta-analysis reported that there was a four-fold increased risk of stillbirth associated with hemorrhage.[22]

The present study documented second most common cause (14.5%) for stillbirth was the hypertensive disorder of pregnancy. A meta-analysis of risk factors in developed countries reported higher chances of stillbirth for women with pregnancy-induced hypertension, pre-eclampsia, and eclampsia.[23] The incidence of IUGR was 4.16% in the present study. The other studies had reported the incidence of IUGR from 2.2% to 18.4 %.[5,6,24]

In our study, SBR was more in female babies (53%). However other studies do not support any association between stillbirth rate and fetal sex.[14,25] Two other studies from India showed the male sex of the fetus to be associated with higher odds of stillbirth.[26,27]

In one study 85.93% of women were delivered before 37 weeks indicating a high prevalence of stillbirth in preterm deliveries which is the same as in our study. In the same study, 86.40% of fetuses weighed below 2000 grams and the majority were male fetuses (69.15%) in contrast to the present study.[19] Although prematurity is not the cause of IUD, many of these cases were associated with preeclampsia, abruption, placenta previa, IUGR and so on.

In the present study, congenital malformation was the cause of stillbirth in 5.2% of cases. While Nayak et al found congenital malformations in 9.4% of total stillbirths.[21] Congenital fetal malformations are unavoidable but IUFD due to these causes can be prevented by routine prenatal screening.

In the present study in 20.8% of cases, the cause was not certain. No contributory cause could be found in 18.8% of cases in the study by Nayak et al and 23.14% by Lichun et al.[14,21] These data are supporting our findings. Unfortunately, we could not perform an autopsy otherwise idiopathic causes might have decreased to some extent. In a study, Sharma et al also documented that twenty percent of stillbirths were unexplained or unclassifiable.[5]

In placental histopathological examination, hypoxia, ischemia, acute and chronic placental insufficiency was the most common finding in the present study that suggests undiagnosed IUGR could be the cause in many unexplained deaths.

Ujjawala et al in their study reported, in histopathological examination of the placenta in IUFD cases, the various abnormality were uteroplacental vascular insufficiency in 10 (37%) cases, acute inflammation in 7 (25.9%), perivillous fibrin deposition in 3 (11.1%), intervillous hemorrhage in 1 (3.7%), intervillous thrombi in 1 (3.7%), villous capillary hypervascularity in 2 (7.4%), calcifications in 3 (11.1%) and villous dysmaturity in 3 (11.1%) cases. No abnormality was found in 7 (25.9%) cases.[28]

Among our booked cases IUDs were due to twin to twin transfusion syndrome, obstetrics cholestasis, overt diabetes, and IUGR were the common causes. These patients did not visit quite long before the unfortunate event.

In many cases, causes are overlapping or there is more than one cause or one factor that leads to another like twin pregnancy leads to preeclampsia or preeclampsia leads to IUGR or abruption placentae. Malpresentation if not managed timely leads to obstructed labor. We could not divide causes strictly into maternal, fetal, and placental causes as there is overlapping like renal disorder which is maternal cause leads to IUGR in which placenta involved.

One interesting trend which we noticed in the present study that the prevalence rate of stillbirth is increasing every year as we are getting more and more referred cases diagnosed with IUD with one or another maternal complication.

Early gestational fetal mortality due to congenital anomalies, sepsis, intrauterine growth restriction, and underlying maternal medical conditions like APLA, renal disease, whereas late gestational fetal mortality appears to be due to both maternal medical disorders like gestational diabetes mellitus and obstetric events that generally revolve around the time of delivery, such as placental abruption and previa, other labor and delivery complications like obstructed labor, shoulder dystocia, rupture uterus or unexplained cause.

From the Figure 2 we can see there are more high-risk cases present in the live group except for abruption but effective antenatal care, timely identification of high-risk cases, well-timed referral, appropriate intervention, judicious intrapartum monitoring, and availability of operative delivery can avoid this ill-fated condition.

Despite the great improvement in health care, in developing countries still, most of the IUDS are due to preventable causes as we can find out from the present study. Availability, accessibility, and affordability of antenatal care and intranatal are the major cruces.

As we know not all the IUDs can be prevented neither we can find out a cause for every IUD but the rate of stillbirth can yet be decreased by combined efforts at every level. The majority of the IUDs can be prevented with health education along with universal and improved antenatal care.

The weakness of the study lies in the fact that it's a single-center study. The autopsy was not done and the cause was assigned based on clinical findings and investigations. Multicentric study with autopsy is justified to put the light on the unknown.

CONCLUSION

The results of this study showed that the incidence of IUD in our center is higher than the national average. There was a significant association between stillbirths and some factors including; unbooked status, low socioeconomic status, antepartum hemorrhage especially abruption placentae, preeclampsia, prematurity, malpresentation which are considered as risk factors for IUFD. Increasing uptake of antenatal care will lead to timely identification and proper management of maternal and fetal complications eventually reducing preventable stillbirths.

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