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Original Research Article

Review of causes of stillbirths in a rural referral hospital: a cross sectional study

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ABSTRACT

Background: The birth of a newborn after twenty-eight completed weeks of gestation weighing 1,000 gm or more, with baby showing no signs of life after delivery is a still born¹. Such death includes both antepartum and intrapartum death. Stillbirths (SB) are the largest contributor to perinatal mortality. Of the estimated 3 million stillbirths which occur yearly, the vast majority are in developing countries, with rates in many developing countries ten-fold higher than elsewhere.

Methods: Descriptive (cross sectional) study was conducted at tertiary referral hospital in rural area of Maharashtra from September 2015 to August 2017. Out of total 3235 deliveries during study period 64 mothers giving birth to 66 cases of still birth (2 cases of twins) satisfied the inclusion criteria and studied to find out prevalence, causes and high-risk factor association with stillbirth.

Results: Stillbirth rate in our study was 20.4/1000 deliveries. 56.25% patients were in the 21-25 years age group. 9.3% were illiterate while 57.81% had education below 12th standard. Most patients were from low socioeconomic status and 57.81% were unregistered. Stillbirth was more common in Para (2-4), premature baby and with male sex preponderance in our study. Most patients 90.62% were delivered vaginally. Preeclampsia, Abruption, Anaemia were common high-risk factor associated with stillbirth. 54.6% cases were unexplained stillbirth while IUGR was noted in 23.4% cases and other causes noted were prematurity, congenital anomaly, cord and placental causes were found in our study.

Conclusions: A significant proportion of stillbirths are preventable by adequate antenatal care. Female literacy and health education, adequate antenatal care, identification of high-risk cases, and timely referral needs to be emphasized among the medical and paramedical personnel at the first point of contact with the pregnant women.

Keywords: Abruption, Anaemia, Perinatal mortality, Preeclampsia, Stillbirths

INTRODUCTION

The birth of a newborn after twenty-eight completed weeks of gestation weighing 1,000 gm or more, with baby showing no signs of life after delivery is a still born¹. Such death includes both antepartum and intrapartum death. Stillbirths (SB) are the largest contributor to perinatal mortality. Globally, over 3 million babies are stillborn every year with the vast

majority occurring in developing countries, while less frequent in developed countries (<1% of births), the large contribution of stillbirth to overall perinatal deaths combined with static or increasing rates over the past decade clearly demonstrates that stillbirth is a major public health problem in these settings.^{2,3} In reviewing the research on stillbirth in developing countries, it becomes clear that because almost half of the deliveries in these settings occur at home, under-reporting of stillbirths is a

problem, and reliable data about rates and causes are unavailable in some areas of the world. Nevertheless, of the estimated 3 million stillbirths which occur yearly, the vast majority are in developing countries, with rates in many developing countries ten-fold higher than elsewhere.⁴ Despite the large number of stillbirths worldwide, the topic of stillbirths in developing countries has received very little research, programmatic or policy attention. A stillbirth is emotionally upsetting to the parents who are now anxious about the chances of having a pregnancy to carry through successfully in the next confinement. From available data, prolonged and obstructed labor, and various infections all without adequate treatment, appear to account for the majority of stillbirths in developing countries.⁴ This study is an endeavour to find out the causes of still birth in rural referral hospital in Maharashtra.

METHODS

Descriptive (Cross sectional) study was conducted at MIMER Medical college, Talegaon (D) Pune Maharashtra from September 2015 to August 2017. Out of total 3235 deliveries during study period 64 patients (2 cases with twin gestation) had still birth and are included in the study (66 babies with stillbirth). The aim of the present study was to evaluate the stillbirth with respect to prevalence, aetiological factors and associated risk factors for stillbirths in rural referral hospital in Maharashtra. All participants provided written informed consent, and for those who could not read or write, the participant information sheet and consent form were explained by the trained interviewer, and a thumb impression was obtained.

Objectives

1. To find out the prevalence of still birth in the rural referral hospital.
2. To identify the aetiological and high-risk factors for stillbirths.

Inclusion criteria

- All the nonviable foetus > 20weeks or
- weighing >500 grams with APGAR score "0" at 1 and 5 minutes.

Exclusion criteria

- Early neonatal deaths are not included in this study.
- Patients where still birth occurred at home or patient delivered at other hospital and referred post-delivery are not included in this study
- Refusal of consent for participation in the study.

Data collection and data management

Data was collected in uniform, consistent and reliable manner by trained qualified doctors with the use of

standard proforma. Key variables such as age, parity, duration of gestation, physical examination, mode of delivery antepartum high risk and complications and intrapartum events were recorded. Results of routine and specialized investigations and ultrasonography were recorded. After delivery and caesarean section placental morphology was studied in detail. Stringent quality assurance measures were followed at various stages of data handling so as to ensure completeness, accuracy and reliability of the data. Data entry and consistency check were done manually.

Statistical analysis was done using Epi-info7 software.

RESULTS

66 cases of stillbirth in present study giving the stillbirth rate of 20.4/1000 deliveries (Table1).

Table 1: Total Number of cases in the study and Still birth rate.

Total no. of deliveries during study period	3235
Total no. of mothers who had still birth (2 twin cases)	64
Total no. of stillbirth during study period	66
Still birth rate in the study	20.4/1000 deliveries

Table 2: Demographic profile of mother.

Age (years)	No. of cases	Percentage
< 20	11	17.1
21 - 25	36	56.25
26 - 30	17	26.5
Educational status		
Illiterate	06	9.3
1-7 th std	09	14.06
8 th -12 th	37	57.81
Graduate	07	10.93
Postgraduate	05	7.81
Occupation		
Employed	33	51.56
Housewife	31	48.43
Socio-economic status		
Upper	03	4.68
Upper middle	04	6.25
Upper lower	05	7.81
Lower middle	44	68.75
Lower	08	12.5
Distance (km) from hospital		
≤5	33	51.56
6-10	14	21.87
11-15	06	9.37
16-20	03	4.68
>20	08	12.5
ANC registration status		
Registered	27	42.18
Unregistered	37	57.81

In the present study, most of studied patients were in the age group of 21-25 (56.25%), maximum no. of stillbirths were observed in mothers with educational status of 8th to 12th class i.e. 57.81%, however 6 (9.3%) mothers were illiterate. About 48.43% of studied patients were housewives and belonged to lower middle socioeconomic class (68.75%). 12.5% of patients came from more than 20km distance. However, majority of patients resided in <5km area around the referral centre (51.56%). Stillbirth rate was high among unregistered cases i.e. 57.81% (Table 2).

Table 3: Labour outcome (N=64 mothers, N1=66 babies).

Parity	No. of cases	Percentage (95%CI)
Primi	28	43.75 (32.00 to 56.05)
Multipara (2-4)	34	53.12(40.90 to 65.08)
Multipara (>4)	02	03.12 (5.3 to 9.94)
Gestational age (weeks)		
20 to <24	10	15.6 (8.22 to 26.08)
24 to <28	21	32.8 (22.17 to 44.98)
28 to <32	10	15.6 (8.22 to 26.08)
32 to <37	13	20.3 (11.79 to 31.47)
≥37	10	15.6 (8.22 to 26.08)
Sex of fetus (N1=66)		
Male	43	65.15 (53.11 to 75.89)
Female	23	34.85 (24.11 to 46.89)
Birth weight (grams) (N1=66)		
500-999	31	46.9 (35.19 to 59.01)
1000- 1499	13	19.6 (11.42 to 30.59)
1500-1999	06	09.3 (3.77 to 17.95)
2000-2499	07	10.6 (4.76 to 19.85)
≥2500	09	13.6 (6.86 to 23.55)
Mode of delivery		
Normal delivery	58	90.62 (81.52 to 96.11)
Instrumental delivery	02	03.12 (5.3 to 9.94)
C - section	04	06.25 (2.02 to 14.39)

In the present study, it was analysed that maximum stillbirths were in mothers with parity of 2-4 i.e. 53.12% of women however 43.75% women were primigravida. 85.93% of patients were delivered before 37weeks indicating high prevalence of stillbirth in preterm deliveries. 86.40% of fetuses weighed below 2000grams and majority were male fetuses (69.15%). 93.74% of women delivered vaginally (90.62% normal delivery and 3.12% by instrumental delivery), however in 4 four cases C-section was done for obstetric indication increasing the maternal morbidity (Table 3).

In 42 cases (65.6%), no maternal high-risk factors were found hence categorized as unexplained maternal cause. However, anaemia was seen in 15.6% mothers having stillbirths. 9.3% cases were of hypertension in pregnancy and 4.6% had abruptio placentae. Few patients had more

than one risk factor associated. (e.g. Anaemia with Preeclampsia) (Table 4).

Table 4: Distribution according to maternal high risks for still births.

Maternal conditions	No. of cases	Percent
Febrile illness	01	01.5
Preeclampsia	06	09.3
Abruption	03	04.6
Hypertension	03	04.6
Anemia	10	15.6
PROM	06	09.3
Diabetes mellitus	01	01.5
Thyroid disease	01	01.5
Multiple pregnancy	02	03.1
No high risk	42	65.6

In 35(54.6%) cases cause could not be found (unexplained). Extreme prematurity was found in 6(9.37%) cases and 15(23.4%) cases were of intrauterine growth restriction (IUGR). However, 3(4.68%) cases were with congenital anomaly, 2(3.12%) were of cord abnormalities (Table 5).

Table 5: Distribution according to etiological factors.

Etiology	No. of cases	Percent
Prematurity	06	9.37
Congenital anomaly	03	4.68
Cord causes	02	3.12
Placental causes	03	4.68
Intrauterine growth restriction	15	23.4
Unexplained	35	54.6

DISCUSSION

Inconsistency in definition of stillbirth

A stillbirth is the death of a baby before or during delivery. Both miscarriage and stillbirth are terms describing pregnancy loss, but they differ according to when the loss occurs. There is no universally accepted definition of stillbirth, and the meaning of this term varies internationally. This lack of a inconsistent definition of stillbirth often makes it difficult to compare data on how frequently it occurs.⁵ The definition recommended by WHO for international comparison is a baby born with no signs of life at or after 28 weeks' gestation.¹

In the United States, a miscarriage usually refers to a fetal loss less than 20 weeks after a woman becomes pregnant, and a stillbirth refers to a loss 20 or more weeks after a woman becomes pregnant.⁵ The definition of "stillborn child" in England and Wales is contained in the Births and Deaths Registration Act 1953 section 41 as amended by the Stillbirth (Definition) Act 1992 section 1(1) and is as follows: "a child which has issued forth from its

mother after the 24th week of pregnancy and which did not at any time breathe or show any other signs of life".⁶ Similar definitions apply in Scotland and Northern Ireland.^{7,8}

The Centers for Disease Control and Prevention (CDC) further classifies stillbirths as either early, late, term.⁹

An early stillbirth is a fetal death occurring between 20 and 27 completed weeks. A late stillbirth occurs between 28 and 36 completed pregnancy weeks. A term stillbirth occurs between 37 or more completed pregnancy weeks

In present study operational definition for stillbirth, 20 weeks is used as cut off for defining still birth. Most of the studies in developed country use the lower age band definition of stillbirth (20/22 or 24 weeks) and hence use of lower band of gestational age permits comparison of present data with literature from developed countries.

Need for studying the causes of stillbirth

Uncovering the causes of stillbirth is important in efforts to identify deficiencies in the provision of care, to focus attention on areas in which improvements can be made, and to determine how new developments or knowledge may improve perinatal outcome. However, identifying the causes of stillbirth is often difficult because of the complex pathophysiological processes in the mother, fetus, and placenta and the fact that stillbirths often result from the interaction of different processes.¹⁰

What present study reveals

Current study shows us the still birth rate of 20.4/1000 deliveries, at a rural hospital in Maharashtra. Stanton et al estimated a stillbirth rate of 25.5 per 1000 total births for developing countries, with Sub-Saharan Africa representing the highest rate (32.2 per 1000 total births), followed by South Asia (31.9 per 1000 total births).² In India, the stillbirth rates vary widely between 20 and 66 per 1000 births in different states, and national figures are among the top 10 countries having higher stillbirth rates.¹¹ Poor reporting and underestimations are also serious concerns.

In 2015 worldwide rate of 18.4 stillbirths per 1000 total births (uncertainty range 16.7-21.0) was reported and In 2000 estimated worldwide SBR was 24.7 implying ARR (Annual reduction rate) of 2 % between 2000 and 2015.¹² Census 2012 data published by Govt of India mentions stillbirth rate of 5 per 1000 birth for national level and Average still birth rate for Maharashtra is 6 per 1000 birth (5 for rural area and 6 for urban areas).¹³

Though present still birth rate is very high (4 times) as compared to national statistics we would like to mention that our cut off for defining still birth is 20 weeks while government statistics are calculated by using WHO definition of 28 weeks for defining the stillbirth. Also

lower SBR in census statistics may be due to under reporting of stillbirths, as in developing countries stillbirths recording is poor.⁴ Various studies have shown lot of variation in the still birth rate in different states within India, with lowest still birth rate in Kerala (10/1000 deliveries in urban area and 11/1000 deliveries in rural area), while Odisha, Rajasthan, Haryana, Karnataka, Uttar Pradesh and Chhattisgarh were having high still birth rate (above 31). The incidence of stillbirth reported from western countries ranges from 4.7-12.0 per 1000 deliveries.^{14,15} This is lower than that observed in our study. However, the incidence rate reported from various studies in India is higher 24.4-41.9 per 1000 birth.^{14,16,17}

In the present study maximum stillbirths were observed in the maternal age group of 20-30 years i.e. 81.25% which is comparable to other Indian studies where majority of stillbirths occurred in the mothers with age was between 20-30 years such as Lakshmi ST et al at Chennai; Saxena V et al at Uttarakhand (77.8%), this is due to Indian cultural backdrop where most of the women are married by 20 years of age and have less knowledge about medical facilities.^{18,19} Similar results were observed in a study conducted at Nepal where maximum patients were between 20-30 years of age i.e. 55.3% which is culturally similar to Indian.²⁰

The socio-economic status and female literacy also influence pregnancy outcome. Women's education is associated with decline in SBR. An educated mother assumes greater responsibility in planning her family and she also avails maternal services appropriately. This study has revealed that most of the women who landed with stillbirth were less educated with 9.3% being illiterates, 14.06% studied only up to primary class and 57.81% women had completed their education up to high school as seen in a routine Indian scenario where women are less educated and unaware of all the facilities which can be compared to studies conducted by Saxena V et al where 38.2% were illiterates; Roy MP et al. (2016) had 40% of illiterates.^{19,21} and Nepal study also majority of patients were less educated.²²

Most of the patients in present study were from lower middle and lower socioeconomic (68.75%), In other studies from India a very strong association with education status and socioeconomic status was found. Kumari C et al reported that 79% women were illiterate and 84.2% from lower socioeconomic class.²³ It is a general observation that countries or regions with high female literacy ratio have low birth rates and mortality rates. According to NHFS the female literacy in Kerala is 93.91% compared to other states of India (74.04%) and still birth rate is 6% and 22% respectively.^{24,25} Proportion of employed (working women) as well as non-working women was almost same in present study (51.56% vs 48.3%). Present study didn't show association of working/employment status and still birth.

Majority of patients were from a distance of <5km (51.56%) i.e. they lived around the rural hospital while 12.5% patients were staying >20km from the health facility. This shows that it's not only transport facility to the health center but the awareness among the community regarding antenatal care is also equally important because most of the patients staying <5km were unbooked as well as with low literacy level resulting in negligence towards pregnancy care which plays an important role increasing stillbirths rate. 57.81% patients were unregistered in our study as compared to registered cases 42.18%. Kameshwaran et al observed 5 times and Ravikumar et al found 4 times higher still birth rate in unregistered women.^{26,27}

The western studies show that increased risk for stillbirth in women over 35 years of age.^{28,29} In present study, however, the fetal deaths were more in the age group of 21-25 years. This is because most of the women in India complete the family before 35 years of age. In present study 43.75% of women were primigravida and 53.12% were multigravidae thus increased parity also contributing to stillbirths as observed in Ashish K. et al study at Nepal and Saxena V et al at Uttarakhand (41.6%).^{19,20} However Dasgupta S. reported increased risk of stillbirth is seen amongst primigravidas and after fifth pregnancy.³⁰

Higher proportion of still birth was observed in male babies as compared to female babies in our study (68.64 Vs 34.85%). Male stillbirths are more likely to occur at a later gestation (median gestation 30.5 weeks, range 20-43 weeks) compared to female stillbirths (median 25 weeks, range 20-40 weeks).^{31,32} It has been argued that boys are biologically weaker than girls.^{33,34}

In the weight distribution among the still born babies 12.12 % babies were more than 2.5kg while maximum 59.09% were <1000 gm suggesting higher still birth rate among the low birth weight babies. Most of the patients were delivered vaginally 90.62% however 3.12% required instrumental delivery and lower segment C. section was required in 6.25% cases for obstetric reason. Saxena V et al in her study also had similar results with 85.6% patients delivered vaginally and C. section was required in 7.2% cases and instrumental delivery in 4.8% cases.¹⁹ Most patients with IUD deliver vaginally however in some cases of CPD (macrosomic baby) or other obstetrics indication may require C. section.

Out of 64 women 42(65.6%) women didn't show any high-risk factor association. Anaemia was noted in 15.6% women followed by severe preeclampsia in 9.3% cases and PROM in 9.3% cases, abruption was seen in 4.6% cases and other high risk such as diabetes, thyroid, infection was noted in 1.5% cases, there were 3.1% cases of multiple pregnancy in present study. Few patients had more than one high risk factor associated (e.g. preeclampsia with anaemia). Lakshmi et al from Chennai in south India found gestational hypertension (47%) and

diabetes in 27% cases while febrile illness was noted in 18% cases.¹⁸ Robert et al mentioned the 25% still birth may be due to maternal infection.³¹ The different mechanisms that cause stillbirth may be by direct fetal infection, placental damage or chorioamnionitis. Infection occurring early in pregnancy may lead to congenital anomalies and stillbirth later. In present study authors found only 1 case of diabetes with still birth however the patient had late registration, late diagnosis and poor compliance to treatment resulting in bad obstetric outcome. Most cases of diabetes who had good control of sugar and were compliant for follow up and treatment had good outcome though there was increased admission rate for NICU for observation of the baby. Ravikumar et al found APH association in 9.8% cases while Nayak and Dalal et al found in 12.9% cases. Preeclampsia was noted in 39.7% cases by Uchil.^{27,36,37}

Among the aetiological factors 35 (23.4%) cases of 64 didn't find the aetiological factors, this was higher as compared to studies by Saxena V et al who reported 22.2% cases as unexplained and Nayak and Dalal et al reported 16.8% cases as unexplained still birth in their study.^{19,36} However, IUGR was most commonly associated with still birth in present study (15 cases-23.4%) Lakshmi et al also noted 22% occurrence of still birth in IUGR group.²⁸

Congenital malformation was seen 3 cases while Saxena V et al found 6.3% cases with congenital malformation and Ravikumar et al found association of congenital malformation in 10.3% cases.^{19,27} Prematurity was noted in 6 cases of still birth in present study. In Nepal, Shreshtha and Yadav reported prematurity as a major risk factor in their study involving 3588 deliveries and similar association with prematurity was reported from Tunisia where an adjusted (for birthweight) OR 6.05 (95% CI 1.85-19.78) was reported among 87 still-births studied in a prospective cohort study.^{38,39} Stringer et al, in a study of 2109 stillbirths in Zambia, reported that extremes of birthweight increased the risk for stillbirth (OR for ≤ 1500 g 56.13, 95% CI 3.48-5.85 and OR for ≥ 4000 g 2.08, 95% CI 1.54-2.80).⁴⁰

CONCLUSION

A significant proportion of stillbirths are preventable by adequate antenatal care. Female literacy and health education will increase the awareness about antenatal care. The importance of adequate antenatal care, identification of high-risk cases, and timely referral needs to be emphasized among the medical and paramedical personnel at the first point of contact with the pregnant women. Every antenatal visit provides an opportunity for health care worker to screen the woman for associated medical or obstetric high risk and institution of the treatment for same, reducing the risk of stillbirth. Better access to appropriate obstetric care, especially during labor, should reduce developing country stillbirth rates dramatically.

Present study uses the lower band of gestational age(20weeks) for defining the stillbirth, hence comparison of our results with developed country data where lower gestational age (20weeks/24 weeks) is used for defining the still birth is possible.

This being hospital-based study our results are based on the cases which are admitted in the hospital while community-based study may give more clear picture and wider inclusion of the data for the still birth scenario.

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