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## Analysis of Risk Factors Causing still Births in a Tertiary Care Hospital of Northern India

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### How to cite this article:

Seema Singhal, Aruna Batra, Rajesh Kumari, *et al.* Analysis of Risk Factors Causing still Births in a Tertiary Care Hospital of Northern India. Indian J Obstet Gynecol. 2024;12(3):110-116.

### Abstract

**Background:** In developing countries most deliveries take place at home or peripheral settings, therefore, information on causes of still birth remain insufficient. ReCoDe (Relevant condition at death) is a classification system that helps to understand causes of still births in low resource settings.

**Aims:** Present study was conducted to identify various clinical conditions that could lead to still births and to classify the still births according to Re.Co.De system.

**Materials and Methods:** An observational study was conducted for six months and records of all the deliveries including still births were reviewed. The causes were classified according to the ReCoDe classification. Any association between maternal factors and still births was analysed.

**Results:** During study period 11,748 births occurred and 283 of them were still births. Still birth rate was 2.41% (24.1/1000 births). 9.5% (27) of still births were intrapartum and 90.5% (256) were ante partum. 9.4% of still births occurred in women having antepartum haemorrhage and 8.1% with fetal growth restriction. This was followed by multiple pregnancy, hypertensive disorders of pregnancy and obstructed labour. When classified as per ReCoDe cause of still birth could not be explained in 9.4% cases.

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**Received on:** 02.09.2024

**Accepted on:** 05.10.2024

**Conclusion:** ReCoDe is an effective method to classify the causes of still births without extensive workup. Health care providers should be encouraged to use ReCoDe to decrease the number of unexplained still births even in low resource setting.

**Keywords:** Still birth; Re.Co.De classification; Perinatal audit; Risk factors.



## INTRODUCTION

Every year over 3 million stillbirths occur in the world.<sup>1</sup> 98% of stillbirths occur in low-income and middle-income countries.<sup>2</sup> Worldwide majority (67%) of still births are known to occur in rural areas because of inadequate facilities for skilled birth attendance and low caesarean section rates.<sup>2</sup> Most of those occur in women who are poor, uneducated and do not have access to optimum antenatal care. National data on the causes of stillbirth are grossly insufficient, and may be unreliable because in developing countries most deliveries take place at home or in settings where no uniformity of reporting is followed.

It is important to evaluate the causes of still birth at all levels of health care system. This will help clinicians to understand not only the shortfalls in management but also will be useful to counsel women regarding their future pregnancies. Standardization for cause assessment is essential so as to avoid bias and to maintain uniformity in data as to aid policy makers to prioritise health service resources and formulate strategies for prevention.<sup>3</sup> Numerous (>35) classification systems are available to classify still births such as CODAC, Re.Co. De, Tulip, Aberdeen, Wigglesworth, but majority depend on extensive investigative workup, or leave too many still births unexplained.<sup>4</sup> Amongst these Re.Co.De (Relevant condition at death) is a clinically based classification system and thus helps us to understand the causes of still births even in low resource settings. This system enables us to identify a cause in approximately 85% (unexplained 15.2%) of cases.<sup>5</sup> We chose Re.Co.De. System to classify still births in present study as it is a clinically based classification system appropriate for a developing country, where extensive investigative workups are not feasible at all levels.<sup>3</sup> Present study was conducted to identify various clinical conditions that could lead to still births and to classify the still births according to Re.Co.De system. The results of this study may suggest that if cause is assigned to each case of still birth in a structured classification system we may be able to reduce the reporting of unexplained still births even in low resource settings where extensive investigative work ups are not feasible.

## METHODS

Present study was conducted in tertiary care teaching hospital for a period of six months. This was an observational study where records of still born babies in the hospital were reviewed during the study period and details were recorded

retrospectively, after taking ethical clearance from institutional review board. Still birth was defined as the death of a fetus at any time after the twenty two weeks of pregnancy. Complete details of the women including age, parity, birth order, booking status, gestational age, obstetric history including previous intra uterine deaths (IUD), Infections or any obstetric complications such as preeclampsia, eclampsia, intra uterine growth restriction(IUGR), ante partum haemorrhage (APH), anaemia, Rh isoimmunisation, maternal systemic illness as fever, acute gastro enteritis were recorded. Women's past medical history for presence of chronic hypertension, renal disease, T.B, diabetes was noted. Delivery details were explored and all the investigations (complete blood count, blood group, blood sugar, blood urea, liver function test, coagulation profile, urine routine and microscopy) were noted. After delivery baby was examined and signs of skin excoriation, skin or umbilical cord staining due to darkened amniotic fluid, and skull softening were recorded. Still birth was categorized into fresh or macerated, foetus was also examined for any abnormalities as congenital malformations, anaemia or features of plethorism.

Placenta, liquor and umbilical cord were examined for any meconium or blood staining, abruption, infarcts, cord entanglements, number of vessels.Cause found for each still birth was classified according to the Re.Co.De. classification given by Gardosi *et al.*<sup>3,4</sup> All the births that occurred in the hospital during study period were also analysed with respect to maternal age, parity, booking status, gestational age, maternal systemic illness and obstetric complications.

## RESULTS

During the study period 11,748 births occurred and 283 of those were still births. Still birth rate was 2.41% (24.1/1000 births). 60.8% (172/283) were macerated and 39.2% (111/283) were fresh still births. Twenty seven (9.5%) were intrapartum and 256 (90.5%) were ante partum still births. 214 (75.6%) were un booked and 69 (24.4%) were booked cases.

During the study period 6,535 booked and 5213 unbooked deliveries occurred and incidence of still births in booked and unbooked cases was 1.05% (69/6535) and 4.11% (214/5,213) respectively. Out of 283 still births 129 (45.6%) were term and 154 (54.4%) were preterm. Among these pre term 16.9% (48/154) were between 28-33<sup>+6</sup> weeks, 16.9% (48/154) between 34<sup>+0</sup> - 36<sup>+6</sup> weeks, 7.1% (20/154) between 22<sup>+0</sup> -27<sup>+6</sup> weeks.

Out of total 283 cases of still births 50.9% (144/283) were > 2.5 kg, 15.2% (43/283) were 1.5-2.5 kg, 42/283 (14.8%) were 1.0-1.5 kg and 19.1% of cases were <1.0 kg. The incidence of still births was highest (21.28%) at gestational age 22<sup>+0</sup> -27<sup>+6</sup> weeks, birth weight <1.0 kg, maternal

age ≤ 18 years (6.25%) and nulliparity (2.98%). 4% of women with systemic infections, 9.4% with antepartum haemorrhage and 8.1% with fetal growth restriction had still births. (Table 1) The causes were classified according to Re.Co.De. classification (Table 2)

**Table 1:** Effect of maternal systemic disease on still births

| Factor                                 | Total birth | Still Birth | Still birth rates % |
|--|-------------|-------------|---------------------|
| Acute maternal illness /maternal fever | 150         | 06          | 4.0                 |
| <i>Medical disorder</i>                |             |             |                     |
| Diabetes                               | 244         | 01          | 0.4                 |
| Heart disease                          | 82          | 01          | 1.2                 |
| Severe anaemia Hb<7gm%                 | 759         | 35          | 4.6                 |
| Pre eclampsia- eclampsia               | 1,132       | 54          | 4.8                 |
| APH                                    | 382         | 36          | 9.4                 |
| Placental insufficiency- IUGR          | 492         | 40          | 8.1                 |
| Multiple Pregnancy                     | 196         | 06          | 6.3                 |
| Obstructed labor/Rupture uterus        | 94          | 04          | 4.0                 |

**Table 2:** Still Births: Assigned Causes (Re.Co.De)

|   | Number | Percentage |
|---|--------|------------|
| <b>Group A (Fetal)</b>                        |        |            |
| Congenital malformations                      | 36     | 12.7       |
| Non immune hydrops                            | 03     | 1.1        |
| Twin pregnancy                                | 06     | 2.1        |
| Placental insufficiency                       | 40     | 14.1       |
| <b>Group-B (Umbilical cord)</b>               |        |            |
| Cord Prolapse                                 | 06     | 2.1        |
| Tight cord around neck                        | 03     | 1.1        |
| <b>Group-C (Placenta)</b>                     |        |            |
| Severe antepartum haemorrhage                 | 36     | 12.7       |
| <b>Group-D (Amniotic fluid)</b>               |        |            |
| Severe oligohydramnios                        | 06     | 2.1        |
| Chorioamnionitis                              | 02     | 0.7        |
| <b>Group-E (Uterus)</b>                       |        |            |
| Obstructed labour/Rupture uterus              | 04     | 1.4        |
| <b>Group-F (Maternal)</b>                     |        |            |
| Hypertensive disorder in pregnancy            | 54     | 19.4       |
| Maternal systemic illness                     | 06     | 2.1        |
| Chronic medical disorders (DM, Heart disease) | 02     | 0.7        |
| Severe anaemia                                | 35     | 12.4       |
| <b>Group-G (Intrapartum)</b>                  |        |            |
| Intrapartum asphyxia                          | 20     | 7.1        |
| Group-I (Unclassified)                        | 26     | 9.2        |

## DISCUSSION

Still birth rates are variable across the globe depending upon the criteria of definition, availability of services and audit. In high-income countries, stillbirth rates are below 5 per 1000 births<sup>6</sup> compared to approximately 32 per 1000 in south Asia and sub-saharan Africa.<sup>1</sup> In present study still birth rate was 24.1/1000 births. Other studies from the same continent show higher still birth rates. In rural Bangladesh it was found to be 36.3 per 1000 total births.<sup>7</sup> In an Indian study the rate was 6.58/1000, however these authors considered weight more than 1000 gm as the criteria.<sup>3</sup>

In present study 90.5% of still births were ante partum and 9.5% were intra partum. The rate of antepartum and intrapartum still births vary depending upon the availability of care and resources. In a study, 62% of stillbirths were classified as ante partum and 38% as intrapartum.<sup>8</sup> In the low income nations, over 50% of stillbirths occur intra partum, compared with less than 15% in high income nation.<sup>2</sup> Intra partum deaths are usually due to obstetric emergencies, whereas antepartum stillbirths are most often attributed to foetal growth restriction/placental insufficiency or to infection.<sup>2</sup> In present study incidence of intrapartum still births was low probably because deliveries were conducted at tertiary care level. Maternal age <18 years was found to be associated with increased incidence of still births. This was contrary to other studies where maternal age >35 years was found to be a significant risk factor for still birth.<sup>3,6,8,9</sup> In present study incidence of still births was highest in nulliparous subjects, similar to other studies.<sup>9</sup> The association of nulliparity and still births is unexplained. However this fact highlights the importance of providing good antenatal care to young nulliparous mothers. Lesser gestational age was found to be associated with increased still birth rates. Rates were highest in pregnancies with gestational age <28 weeks. It was observed that as gestational age increases, incidence of still birth is reduced and this association was found to be statistically significant. Similar results were seen in other studies too. Birth weight was an important parameter that affect the incidence of still births. In an Indian study it was seen that still birth rates were 26.72% in low birth weight fetuses (1-1.5kg) whereas the incidence was lower *i.e.* 9.48% with higher birth weight babies (2.6-2.9 kg).<sup>3</sup> In present study still birth rates for birth weight 1-1.5kg was 22.5%, however still birth rates for birth weight >2.5 kg was low *i.e.* 1.35%. Savvas *et al.* also found a strong relationship between still birth and small for

gestational age. They found half the still born were less than 10 percentile for weight.<sup>10</sup>

Maternal obstetric and systemic complications were analysed to ascertain the high risk factors to cause still births. It was found that that severe antepartum haemorrhage and fetal growth restriction were the most common high risk factors to cause still births. Still births occur in 9.4% cases of ante partum haemorrhage and 8.1% cases of fetal growth restriction. This is followed by multiple pregnancies, hypertensive disorders of pregnancy and obstructed labour. Out of maternal systemic complications severe anaemia, maternal acute illness such as fever is followed by heart disease and diabetes mellitus as high risk factors for still births.

In present pregnancy an obstetric cause was identified in 49.5% of cases, another study observed obstetric cause responsible for IUD in 29.3% of cases.<sup>11</sup> Similarly a maternal cause was identifiable in 29% of cases in a study conducted from a developing nation.<sup>8</sup> This difference could be due to increased incidence of still births in unbooked cases than booked cases (4.11% vs 1.05%). In present study that may have led to higher prevalence of severe obstetric complications in unbooked population and thus increasing the incidence of still births in this population.

Causes of still births were then classified according to Re.Co.De classification. Fetal growth restriction was identified as the most common cause of fetal death in utero.<sup>4</sup> In present study we observed that 14.1% of the fetal deaths were due to fetal growth restriction. In another study slightly lower incidence of fetal growth restriction *i.e.* 11.49% is reported.<sup>3</sup> Ante partum haemorrhage severe enough to cause fetal death in utero was observed in at least 12.7% of cases. Similar incidence 10% and 12% of antepartum hemorrhage is reported in other studies also.<sup>3,8</sup>

Hypertensive disorders of pregnancy is a common cause of still births. In our study the overall incidence of still births in this category was 19.4%. Another Indian study observed similarly high incidence *i.e.* 20% still births in women with hypertensive disorders.<sup>3</sup> In a study conducted in another developing nation from the same continent also showed 19% incidence of still births in this group of patients.<sup>7</sup>

Anaemia as a cause of still birth was attributable in 12.4% of cases. In other studies also severe anaemia was found as a cause of still births in 6.89%<sup>3</sup> and 2% of women. In sub-saharan Africa 63% still births were attributable to anemia in mothers.<sup>12</sup> Congenital malformations were present

in 12.3% of cases in present study and the most commonly observed anomalies were neural tube defects. On the other hand another Indian study showed that only 4.3% of cases of still births were attributable to congenital malformations.<sup>3</sup> Study by Wapner *et al.* found a very high percentage *i.e.* 25% of still births were caused by congenital malformations<sup>13</sup>, however study done from the same continent observed 3% of still births were caused by congenital malformations.<sup>6</sup> In our study, we found that rupture uterus and obstructed labour attributed to 1.8% cases of still birth and these conditions were responsible for 8% of cases of still birth in another study.<sup>3</sup> This lower incidence could be explained as incidence of these obstetric mishaps are lower in tertiary care hospitals. All the patients that had these conditions were referred cases from peripheral centres. Multiple pregnancy as a cause of SB was identified in 2.1% of cases as compared to 6.1% in another study<sup>11</sup> and this difference could be due to difference in incidence of twins in different geographic areas.

The reported numbers of unexplained stillbirths range from 9 to 71%<sup>4,5</sup> depending on the sources of information available and the classification system used.<sup>13,14</sup> In present study the causes when classified according to Re.Co.De classification the incidence of un explained still births was found to be 9%. In other studies where Re.Co.De classification system was used for classifying the causes of still births, incidence of un explained still births was found to be 20%<sup>16</sup> and 30%.<sup>5</sup> In a recent study where Aberdeen Wigglesworth classification, was used to classify the causes of still birth, 49.7% of cases remained unexplained whereas using the Re.Co.de classification system only 21% of cases were categorized as unexplained.<sup>17</sup> Using Re.Co. De classification we can classify majority of still births according to their cause even without extensive workup. Health care providers should be encouraged to maintain health records and should review all the cases of still births and classify them. This will generate national data on the still births, will aid policy makers to formulate strategies and implement prevention. Our study highlights the fact that identification of maternal high risk factors during antenatal period is essential to prevent still births. Awareness of these facts will enhance antenatal care.

**Acknowledgements:** None

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