

1 **Analysis of Stillbirth As Per ReCoDe**
2 **Classification System:ACross-Sectional Study**

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8 **ABSTRACT**
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BACKGROUND-Classification of stillbirths by Relevant Condition at Death (ReCoDe) is one of the sole classification systems developed specifically to identify causes of fetal death-” What went wrong, not necessarily why”. It is derived from a population-based cohort study in England, and using this system, nearly most of stillbirths can be classified. It is structured, in a hierarchical system, first addressing conditions affecting the fetus and then moving in simple anatomic groups, subdivided into pathophysiologic conditions where the first on list is the primary condition applicable to a case.

This classification relies more on clinical information rather than histopathologic data, it is more relevant in the developing world where lack of expertise and unwillingness of parents for autopsy and/or placental biopsy is not a routine practice.

Aims and objectives: The present study aimed to analyze stillbirth as per ReCoDe classification system.

Methodology: A cross-sectional study was conducted in the Department of High-Risk Pregnancy & CriticalCare in Obstetrics a sub-specialty of Obstetrics and Gynecology at, Bharati HospitalaffiliatedtoBharatiVidyapeeth[DeemedtobeUniversity]MedicalCollege,Pune, Maharashtra, India.

Results- Using ReCoDe classification system we were able to classify 98% of stillbirths, that helped us in further patient counseling and preventive actions. The commonest causes for stillbirths were hypertensive disorders of pregnancy, followed by placental causes (abruptio placentae). Other prevalent causes were oligohydramnios and fetal growth restriction. Few rare causes like uterine rupture and and umbilical cord hemangioma were also reported.

Conclusion- Implementation of ReCoDe classification system helped us to classify up to 98% of still births. This classification system reduces the predominance of stillbirths currently categorized as unexplained. It helps in prevention of stillbirths which may be avoidable.

Keywords: ReCoDe, IUFD, still births, fetal growth restriction.

1. INTRODUCTION

According to a recent report called A Neglected Tragedy: The Global Burden of Stillbirths, the first-ever stillbirth report by the UN Inter-Agency Group for Child Mortality Estimation (UN-IGME) [1], every 16 s one stillbirth (SB) occurs: about two million SBs per year. These losses are responsible for social, psychological, economic, and medical negative consequences [1][2][3]. "SBs can also cause misunderstandings between parents and medical practitioner's, causing medical malpractice claims"[4].

"The World Health Organization (WHO) describes stillbirth as a baby born with no signs of life at or after 22 weeks of gestation but recommends that a 28-week cut-off be used for international comparison"[4]. "International Classification of Diseases version 10 (ICD-10) recommends including the dead fetuses of ≥ 22 weeks of gestation or weighing ≥ 500 gm as stillbirth"[5].

"The predominance of foetal deaths ending up in a non-specific or unexplained category occurs despite the use of three classification methods: the pathophysiological classification by Wigglesworth, the foetal and neonatal classification, and the revised obstetric (Aberdeen) classification. Any classification system that results in such a high number of cases being defined as unexplained would seem not to be fulfilling its purpose"[6]

"Classification of stillbirths by Relevant Condition at Death (ReCoDe) is the best classification systems especially developed to bring about causes of fetal death-What went wrong, not necessarily why"[7]. It is derived from a population-based cohort study in England, and using this system, nearly 85% of stillbirths can be classified.

"It is structured, in a hierarchical system, first addressing conditions affecting the fetus and then moving in simple anatomic groups, subdivided into pathophysiologic conditions where the first on list is the primary condition applicable to a case. This classification relies more on clinical information rather than histopathologic data, it is more relevant in the developing world where lack of expertise and unwillingness of parents for autopsy and/or placental biopsy is not a routine practice" [16].

2. MATERIAL AND METHODS

Across-sectional study was conducted in the Department of High-Risk Pregnancy & Critical Care in Obstetrics a sub-specialty of Obstetrics and Gynecology at Bharati Vidyapeeth [Deemed to be University] Medical College, Pune over a period of 12 months from 1st September 2023 to 31st August 2024. Patients diagnosed clinically and on ultrasonography to have fetal demise after 22 weeks of gestation were included in the study.

Data was collected from the indoor records of all patients having stillbirth. Diagnosis at the time of admission, demographic details, associated maternal risk factors, fetal, placental and cord abnormalities were noted. ReCoDe classification system was used for analysis.

The institutional ethics committee of BV [DTU] MC gave approval for the conduct of this study.

3. RESULTS AND DISCUSSION

The present study was conducted with the aim to analyze stillbirth as per ReCoDe classification system, so that the maximum of the stillbirths could be classified. There was a total of 50 cases enrolled within a period of 1 year. Demographic details showed a majority of stillbirth occurred in the age group of 20-35 years, and most of them were primigravida's. Most stillbirths occurred at gestational age between 28- 34 when the fetus would be mature enough to survive and do well.

TABLE 1- DEMOGRAPHICS

AGE (in years)	
< 20	2 (4%)
20-<35	40 (80%)
>/=35	8 (16%)
Gravida	
G1	19 (38%)
G2	15 (30%)
G3	14 (28%)
G4	2 (4%)
>/= G5	0 (0%)
Gestational Age (in weeks)	
< 28	10 (20%)
28 - <34	27 (54%)
>/= 34	13 (26%)

Most common mode of delivery was vaginal deliveries, out of which most of them were preterm vaginal deliveries. Following table shows the details of same-

TABLE 2- MODE OF DELIVERY

FTVD	5 (10%)
PTVD	33 (66%)
FRTLSCS	4 (8%)
PTLSCS	8 (16%)

By using ReCoDe classification system we were able to classify majority of the stillbirths, only 1 case was unclassified. In analysis some of the stillbirth's were having more than one cause. The details are given in Table 3.

TABLE 3- CLASSIFICATION OF STILLBIRTH BY ReCoDe

GROUP A- FOETAL CAUSES	
Lethal congenital anomalies	1 (2%)
Infections – Chronic/ Acute	0 (0%)
Non-Immune Hydrops	1 (2%)
Isoimmunization	0 (0%)
Foetomaternal hemorrhage	0 (0%)
Twin to twin transfusion syndrome	1 (2%)
Fetal growth restriction	6 (12%)
GROUP B- UMBILICAL CORD	
Prolapse	1 (2%)
Constricting loop/ knot	1 (2%)
Velamentous insertion	0 (0%)
Others- (umbilical cord hemangioma)	1 (2%)
GROUP C- PLACENTAL CAUSES	
Abruptio	12 (22%)
Previa	1 (2%)
Vasa Previa	0 (0%)
Placental insufficiency	10 (20%)
Others – (accreta)	1 (2%)
GROUP D- AMNIOTIC FLUID	
Chorioamnionitis	1 (2%)
Oligohydramnios	10 (20%)
Polyhydramnios	3 (6%)
Others	0 (0%)
GROUP E- UTERUS	
Rupture	1 (2%)
Uterine anomalies (subseptate uterus)	1 (2%)
Others	0 (0%)
GROUP F- MOTHER	
Diabetes	5 (10%)
Thyroid disease	1 (2%)

Essential hypertension	2 (4%)
Hypertensive disease in pregnancy (Preeclampsia, HELLP, Eclampsia)	21 (42%)
APLA syndrome	0 (0%)
Liver disease in pregnancy (AFLP)	1 (2%)
Drug misuse	0 (0%)
Others	2 (4%)
GROUP G-INTRAPARTUM	
Asphyxia	0 (0%)
Birth trauma	0 (0%)
GROUP H- TRAUMA	
External	0 (0%)
Iatrogenic	0 (0%)
GROUP I- UNCLASSIFIED	
No relevant condition identified	1 (2%)
No information available	(0%)

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83
84 “Classifications of stillbirths are the need of hour for optimizing health care policies, surveillance, formulation of care plan
85 and planning pre-conception preventive measures. There is a wide variety of these classifications in the literature,
86 reflecting differences in criteria and available information for recording stillbirths and in existing health information systems
87 over time and between countries”[8].
88

89 “The classification called RECODE (Relevant Condition at Death) is intended to be used in a strictly hierarchical manner
90 and designed to organize information on the clinical conditions associated with the death rather than why the death
91 occurred. This makes it possible to avoid a case-by-case analysis of the circumstances leading to the death and to apply
92 the classification retrospectively to existing databases. Other strengths of this classification are that it has a clear
93 hierarchical structure, is based on ICD codes, and enables 85% of stillbirth cases to be assigned a relevant condition”[8] .
94

95 This classification system relies more on clinical information rather than histopathological data, so this system is
96 especially helpful in developing and low resource countries where patients are unwilling for autopsy due to financial and
97 social reasons.
98

99 The present study was undertaken to classify maximum still births occurring in our institute and establish ReCoDe
100 classification as a part of Standard Operating Protocols in management of stillbirths.
101

102 By using ReCoDe classification we were able to classify maximum number of stillbirths (98%), which were earlier
103 remaining unclassified. Before application of this classification system for stillbirths around 60% of stillbirths remained
104 unclassified in our institute.
105

106 Almost 80% of the still births were in the age group 25-35 years and is comparable with the study done by Shah et al [9] .
107 Taking into consideration the mean birth interval of approximately 2.5 to 3 years, our outcome with regard to the most
108 prevalent age group for pregnancy and resultant stillbirth matches with the beliefs and cultural practices of India where
109 marriages and pregnancies at young age are common.
110

111 Nearly 2/3rd of cases having stillbirths were multigravidas. Most common mode of delivery seen was vaginal route (76%),
112 out of which 66% were preterm vaginal deliveries.
113

114 In our study most common cause of stillbirth was maternal cause and in which most common single factor causing
115 stillbirths were hypertensive disorders of pregnancy and was comparable with the study by Shah et al [9]. Amongst
116 placental causes, abruptio placentae (mostly secondary to pregnancy induced hypertension) showed the highest
117 prevalence and was second most common cause of stillbirths (22%).
118

119 The most common fetal risk factor identified was fetal growth restriction (12%), study by Gardosi et al [6] and Ajini et al[10]
120 have concluded fetal growth restriction as the commonest cause for still birth. In our study it came out to be the 4th most
121 common cause.
122

123 We reported 20% of all stillbirths were complicated with oligohydramnios amongst amniotic fluid causes similar to the
124 study done by Shah et al [9] and Yagnik and Gokhle[11]. Other associated maternal risk factors like hypertensive disorders
125 of pregnancy, uteroplacental insufficiency, diabetes mellitus, post-dated pregnancy, anemia, premature rupture of

126 membranes can cause oligohydramnios and are itself a risk factor for stillbirth [12]. It can cause fetal health compromise
127 by causing complications such as cord compression, meconium aspiration syndrome, pulmonary hypoplasia, and
128 infections in cases of prolonged rupture of membranes[13].
129

130 “Amongst umbilical cord causes we reported only 3 cases, in which we saw one of the rare causes of stillbirth umbilical
131 cord hemangioma. Umbilical cord hemangiomas can lead fetal demise by reducing the umbilical blood flow. This might be
132 due to the mechanical constriction of the umbilical circulation by the tumor; the umbilical cord torsion or the stenosis of
133 umbilical vessels caused by intravascular proliferation of the hemangioma”[14].
134

135 In uterine causes we reported a single case of uterine rupture and one case of uterine anomaly causing stillbirth. There
136 were no cases seen in the group of intrapartum and traumatic causes causing stillbirths and one case was unclassified.
137

138 Addition of histopathological reports could have added on to further better classification of still birth as was seen in study
139 done by Emily et al [15]. But due financial issues and reluctance of patient for fetal autopsy and histopathological testing,
140 we use ReCoDe classification system that doesn't involve histopathological testing and classifies maximum number of
141 stillbirths.
142

143 The data collected after classifying stillbirths was helpful in counseling of patient's and relative, also we can use
144 preventive and screening strategies for prevention of stillbirths in future pregnancies.
145
146

147 **4. CONCLUSION**

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149 Stillbirths are the largest contributor to perinatal mortality. The previous used classification systems were able to classify
150 only one third of the stillbirths, remaining were unclassified. Using ReCoDe classification system we can classify 85%-
151 90% of stillbirths.

152 We strongly recommend use of this classification system for stillbirths and this will help in prevention and reduction of
153 further stillbirths.
154

155 **Disclaimer (Artificial intelligence)**

156 Option 1:

157 Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.)
158 and text-to-image generators have been used during the writing or editing of this manuscript.

159 Option 2:

160 Author(s) hereby declare that generative AI technologies such as Large Language Models, etc. have been used during
161 the writing or editing of manuscripts. This explanation will include the name, version, model, and source of the generative
162 AI technology and as well as all input prompts provided to the generative AI technology

163 Details of the AI usage are given below:

- 164 1.
- 165 2.
- 166 3.

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173 **AUTHORS' CONTRIBUTIONS**
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175 First author Anisha Singh designed the study, performed the statistical analysis, wrote the protocol, and wrote the first draft
176 of the manuscript. Second Author Aniket Kakade managed the analyses of the study and the literature searches. All
177 authors read and approved the final manuscript."
178

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180 **ETHICAL APPROVAL**
181

182 All authors hereby declare that study have been examined and approved by the institutional ethics committee and have
183 therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki."
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227 **DEFINITIONS, ACRONYMS, ABBREVIATIONS**

228 **ReCoDe:** Relevant condition of death.

229 **IUFD:** Intrauterine fetal demise.
230

231 **APPENDIX-** ByusingReCoDe classification sytem it helped us to classify maximum number of stillbirths, which was
232 helpul in counseling of the mother and relatives about the present condition and how can we prevent it in future.
233