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### ***Original Article***

## **Stillbirths - Determining the associated factors and causes according to relevant condition at death: an experience from Pokhara, Nepal**

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### **Abstract**

#### **Background**

Stillbirth contributes significantly to perinatal mortality. This study was conducted with aim to determine various factors associated with it and to define the causes of stillbirth according to relevant condition at birth.

#### **Materials and Methods**

This is prospective cross-sectional study conducted in the Department of Obstetrics and Gynaecology of Manipal Teaching Hospital from July 2015 to June 2017. All cases of stillbirth occurring during antenatal or intrapartum period after 28 weeks of gestation or fetus weighing 1000 grams or more were included. Detailed demographic parameters were noted. After delivery, fetus, placenta, umbilical cord and amniotic fluid were noted in detail. Data was entered in SPSS version 16 and analysis done.

#### **Results**

The stillbirth rate was 22 per 1000 births. Low educational level of women, lack of antenatal care, multiparous status, gestational age less than 34 weeks, low birth weight and male gender of fetus were found to be significantly associated with stillbirths. The cause of fetal death could be identified according to relevant condition at death in 84% of cases. Only in 16%, the cause of stillbirth was not identified. Intrauterine growth restriction was the commonest cause of stillbirth (22%), followed by congenital anomalies (15%) and hypertensive disorders of pregnancy (14%). Other causes were abruptio (7%), intrapartum asphyxia (7%) and rupture uterus (5%). Other minor causes were anemia, diabetes, cord prolapse and amniotic fluid abnormalities.

#### **Conclusion**

Low level of education, lack of quality antenatal care, multiparity, low gestational age and birth weight and male sex of fetus were factors associated with stillbirth. The cause of stillbirth was identified in most of the cases and largely was due to intrauterine growth restriction.

#### **Key words:**

*Risk factors, ReCoDe classification, Stillbirth*

#### **Introduction**

World Health Organization defines stillbirths as a baby born at 28 weeks of gestation or more with birth weight of 1000 grams or more or the body length of 35 cm or more. [1] Globally, at least 2.6

million stillbirths occur every year and most of them are attributable to preventable causes. [2,3,4] However, stillbirth was not recognized as a global burden of disease and were not tracked under the Millennium Development Goals and remained

unconsidered as an individual death by International Classification of Disease till recent past. [1,2] Only recently has the 10<sup>th</sup> revision of the International Classification of Disease incorporated the deaths during the perinatal period and provided a system for classifying perinatal cause of death. [5] Moreover, stillbirth is not counted in the country data in more than 90 countries of the world including Nepal. [1,2]

Stillbirths contribute largely in the perinatal mortality of a country. However, the progress in reducing stillbirths is slower than that of the neonatal deaths. [6] This makes stillbirths one of the major public health burdens that has been overlooked. Stillbirth is a tragedy not only to the family but also to the treating obstetrician. Not only that a potential life was lost, mothers experiencing stillbirths suffer psycho-social consequences like anxiety, depression, stress disorders and stigmatization [1] and also the future prospects of fertility and pregnancy outcome becomes one the major concerns for them.

It has been observed that most of the stillbirths are preventable. [2,3,4] In order to prevent deaths, it is crucial to understand the factors associated with deaths and to know the causes behind the deaths. A clear understanding of cause of death is clinically vital in counseling the bereaved family about the loss and future prospects of pregnancy; in formulating and planning protocols for future gestation. At a policy level, identifying causes is important for managing strategies for prevention and prioritizing medical services at areas needed. Only then can the stillbirth burden be reduced.

Very few studies have been conducted in Nepal to identify the causes and associated factors despite the fact that it is a direct indicator of the quality of antenatal and intrapartum care of the woman. Causes of stillbirth can be analyzed by many different

classifications but Relevant Condition at Death (ReCoDe) is the only classification system specifically developed for classification of the stillbirths unlike the other classification system and is specifically useful in developing countries where extensive investigations to determine the cause may not be possible [7].

This study was conducted in order to determine the factors associated with stillbirth and to analyzing its causes according to Relevant Conditions at Death (ReCoDe).

### **Material and Methods**

This was a prospective cross-sectional study conducted in the Department of Obstetrics and Gynaecology of Manipal Teaching Hospital from July 2015 to June 2017 for a period of 24 months. It is a tertiary care referral care centre of Western developmental region of Nepal.

The entire pregnant women admitted with intrauterine fetal deaths with gestational age more than 28 weeks were included in the study. Gestational age was calculated from the last menstrual period when the mother was sure of date. If she was not sure, then period of gestation was calculated from ultrasound dating of first trimester if available. Whenever the period of gestation could not be calculated, birth rate more than 1000 gm were taken as the cut off value for including the cases of stillbirth. The study also included mothers who were more than 28 weeks of gestation, who had a viable pregnancy at admission but fetal death occurred during hospital stay and the baby was delivered with no signs of life. Verbal informed consent was taken from the mothers after informing them about the nature of the study.

A detailed history pertaining to age, caste, area of residence, educational and antenatal booking status was taken and

noted in the preformed proforma. History regarding the current pregnancy, obstetric history, past history of the mother was taken and noted. Gestational age, antenatal investigations, previous ultrasound were also noted. If they did not have any investigations, routine blood investigations like complete blood count, urine routine and microscopy, blood group, random blood sugar, serology for hepatitis B, C, HIV and syphilis were sent and reports noted. Serology for TORCH could not be sent as the test was not available at our centre. All the mothers with stillbirths were managed according to the hospital protocol.

For the mothers who had intrapartum deaths, labour events like the duration of labour, time of rupture of membrane, colour of liquor were also noted.

Once the delivery occurred, fetus, placenta and the umbilical cord were examined in detail. Fetus was weighed. Whether the fetus was fresh or macerated when born was noted. Fetus was also examined to see for any external anomalies. Placenta was weighed and examined for any morphological anomalies in placenta, point of cord insertion, presence of retroplacental clots, oedema and infarcts. The colour, odour and amount of amniotic fluid were noted at time of delivery. Umbilical cord was also examined in detail for the presence of true knots, length and the number of vessels. However, none of the deceased fetuses were sent for the postmortem examination.

For every case of intrauterine fetal death that occurred, two unmatched controls were taken. Controls were two patients delivering consecutively after delivery of stillborn. Controls were taken to analyze the association of the various risk factors for stillbirths. Information on age, caste, address, status of booking, educational level of mothers, parity, history of previous abortion or stillbirth, gestational age, birth

weight and sex of fetus were taken from the controls. Data were entered in the proforma.

Each case of stillbirth was analyzed for the cause of death. All deaths were analyzed and classified according to Relevant Condition at Death (ReCoDe). This new classification system developed in 2005 helps in understanding the cause of stillbirths [7]. This classification system seeks to establish what had gone wrong than why it went wrong. According to this system, primary cause leading to death is first classified according to anatomical groups starting from conditions affecting fetus then to conditions affecting umbilical cord, placenta, amniotic fluid, uterus, mother, intrapartum, trauma and unclassified group. Each of anatomical group is further subdivided into pathophysiological conditions. Primary cause was identified as the first on the list that is applicable. When available, the secondary cause was also coded [7]. The classification system according to ReCoDe is given in table no 1.

*Table 1: ReCoDe Classification System of Aetiological Classification of Stillbirths (relevant condition at birth)*

<b>Group A: Fetus</b>	Congenital anomalies	<b>Group E: Uterus</b>	Rupture
	Infection		Uterine anomalies
	Non immune hydrops		Others
	Isoimmunization	<b>Group F: Mother</b>	Diabetes
	Fetomaternal haemorrhage		Thyroid disorder
	Twin transfusion		Essential hypertension
	IUGR		Hypertensive disorders in pregnancy
<b>Group B: Umbilical cord</b>	Cord prolapse	Lupus or antiphospholipid syndrome	
	Constricting loop or knot	Cholestasis	

	Velamentous insertion		Drug misuse
	Others		Others
<b>Group C: Placenta</b>	Abruptio	<b>Group G: Intrapartum</b>	Asphyxia
	Previa		Birth trauma
	Other placental insufficiency	<b>Group H: Trauma</b>	External
Others	iatrogenic		
<b>Group D: Amniotic Fluid</b>	Chorioamnionitis	<b>Group I: Unclassified</b>	No relevant condition identified
	Polyhydramnios		No information available
	Oligohydramnios		

Data was analyzed using SPSS version 16. Simple percentage and Chi square test were used for statistical analysis and p-value <0.05 was considered to be statistically significant.

**Results**

There were total of 100 stillbirths during the study period. There were 4516 births during the study period giving stillbirth rate of 22 per 1000 births.

The demographic characteristics of mothers with stillbirths and controls are given in table no 2. On Chi square analysis, significant association was found with low level of education (primary level or below) and poor antenatal supervision of mothers with stillborn babies compared with those of controls.

*Table No 2: Demographic Characteristics of Mothers with Stillbirths and Controls*

Characteristics	Cases of IUFD (n= 100)	Controls (n= 200)	p- value
<b>Age (years)</b>			
≤ 19	9 (9%)	19 (9.5%)	0.30
20-35	82 (82%)	172 (86%)	
≥ 35	9 (9%)	9 (4.5%)	
<b>Caste</b>			
Brahmin Chettris	48 (48%)	100 (50%)	0.06
Matawala	26 (26%)	70 (35%)	

Dalits	22 (22%)	28 (14%)	
Others	4 (4%)	2 (1%)	
<b>Area of residence</b>			
Rural	78 (78%)	151 (75.5%)	0.6
Urban	22 (22%)	49 (24.5%)	
<b>Educational Status</b>			
Illiterate	9 (9%)	4 (2%)	<0.001
Primary level	30 (30%)	36 (18%)	
Secondary level	33 (33%)	96 (48%)	
Higher Secondary level	22 (22%)	60 (30%)	
University level	6 (6%)	4 (2%)	
<b>State of Booking</b>			
Booked	10 (10%)	57 (28.5%)	<0.001
Booked at tertiary level care	27 (27%)	32 (16%)	
Booked at primary level care	54 (54%)	110 (55%)	
Unbooked	9 (9%)	1 (0.5%)	

*Figures in the parentheses indicated percentage*

The obstetric characteristics of the mothers with stillbirth in presented in table 3. On statistical analysis, multiparous status of mother, gestational age less than 34 weeks, birth weight less than 2500 grams and male gender was more common in stillborn fetus compared to the controls.

*Table 3: Obstetric Characteristics of the Mothers with Stillbirths and Controls*

Characteristics	Cases of IUFD (n= 100)	Controls (n= 200)	p- value
<b>Obstetric History</b>			
None	81 (81%)	153 (76.5%)	0.29
H/O Abortion	14 (14%)	41 (20.5%)	
H/O Stillbirth	5 (5%)	6 (3%)	
<b>Parity</b>			
1	41 (41%)	131 (65.5%)	< 0.001
2-3	54 (54%)	66 (33%)	

≥4	5 (5%)	3 (1.5%)	
<b>Gestational Age (weeks)</b>			
28-34	51 (51%)	20 (10%)	< 0.001
35-37	14 (14%)	26 (13%)	
38-41	33 (33%)	147 (73.5%)	
≥42	2 (2%)	7 (3.5%)	
<b>Birth Weight (gm)</b>			
< 1000	6 (6%)	2 (1%)	< 0.001
1000-1500	32 (32%)	7 (3.5%)	
1500-2500	38 (38%)	55 (27.5%)	
2500-4000	23 (23%)	132 (66%)	
>4000	1 (1%)	4 (2%)	
<b>Sex of Fetus</b>			
Male	68 (68%)	102 (51%)	0.005
Female	32 (32%)	98 (49%)	

Figures in the parentheses indicated percentage

The classification of the causes of stillbirths according to ReCoDe is presented in table 4.

Table 4: Classification of Stillbirths by Relevant Condition at Death (ReCoDe)

Causes of Stillbirth	ReCoDe Primary Classification (n=100)	ReCoDe Secondary Classification System						
		IUGR	Abruptio	Oligo	Polyhydramnios	Hypertensive disorders	Anemia	Asphyxia
Gr. A: Fetus	Cong Anom	15 (15%)	4					
	IUGR	22 (22%)		3	5	1	4	
Gr. B: Umbilical cord	Cord prolapse	1 (1%)						1
Gr. C: Placenta	Abruptio	7 (7%)						7

Gr. D: Amniotic Fluid	Polyhydram	1 (1%)							
	Oligohydram	4 (4%)							2
Gr. E: Uterus	Rupture	5 (5%)							5
Gr. F: Mother	DM	2 (2%)			1				
	Thyroid disorder	1 (1%)							
	HTN disorders	14 (14%)							
	Anemia	2 (2%)							1
	Fever	1 (1%)							
Gr. G: Intrapartum	Asphyxia	7 (7%)							
Gr. H: Trauma	External	2 (2%)		2					
Gr. I: Unclassified	Condition unidentified	16 (16%)							
<b>Total</b>		100 (100%)	4	2	3	1	5	1	20

Figures in the parentheses indicated percentage

ReCoDe classification could define causes in 84% of stillbirths. Only 16% of stillbirths were classified in Group I unclassified group as the condition that led to death could not be identified. Most of the intrauterine fetal death was due to intrauterine growth restriction (IUGR) (22%). This was followed by congenital anomalies (15%) and hypertensive disorders in pregnancy (14%). Secondary causes of death could be analyzed according to the ReCoDe classification 36 cases of stillbirth. They were intrapartum asphyxia, hypertensive disorder in pregnancy, IUGR, oligohydramnios, abruptio and anemia.

## Discussion

The definition of stillbirth varies from country to country across the world depending upon the availability of the technological advancements in the country to provide care in order to increase the chance of survival of the fetus born at a certain gestational age. The cutoff point of lower gestational age of 20 to 22 weeks are used by the upper and middle-income countries while higher gestational age of 28 weeks is used by low and lower middle-income countries [8]. In our study, a cutoff point of 28 weeks was used. Stillbirths occurring before 28 weeks are normal managed as missed abortion at our centre and since Nepal belongs to low income country, this definition was adopted.

The stillbirth rate in our study was 22 per 1000 births similar to that reported in most of low and middle-income countries. [8] In our study, women with stillbirths had low level of education, lacked antenatal care, were multiparous and had lesser gestation age. Stillbirths were also observed to be more frequent in fetus with birth weight below 2500gm and in male fetus. Another study conducted in Nepal also reported low level of education, multiparous status and lack of antenatal care to be associated with stillbirths. [9] Extremes of age at pregnancy, primiparity found to be associated with stillbirth in other studies was not found in our study [8]. Educating and empowering women is important as education among all is one of the major factors that affect health seeking behavior of the women and this in turn can bring about a favorable pregnancy outcome.

Stillbirths reflect the antenatal and intrapartum care of mothers. In our study, lack of antenatal care was significantly associated with the occurrence of stillbirths similar to other studies. [8,9,10,11,12,] Antenatal care not only provides opportunity for supervision of pregnancy but also allows educating the women

about the danger signs that may necessitate immediate care. However, the quality of antenatal care also matters to a great extent in pregnancy outcome. It was observed in our study that 54 % stillbirths were in women who were booked at primary care level where antenatal care is provided by auxiliary nurse midwives (ANM) at primary health care centre or health posts. Lack of ultrasound and basic blood investigations that are so crucial in diagnosing various pregnancy complications at these centres hampers the quality of antenatal supervision provided. Improving the quality of antenatal care thus seems to be vital in bringing out best of results.

Gestational age at the time of delivery was a crucial factor for outcome of pregnancy as found in our study. More number of stillbirths was detected at lesser gestational age as in most of the other studies as well. [10,11,12,14-17] Similar association was found for the birth weight of fetus for known reasons.

In order to determine cause of stillbirths, it is imperative to follow a standard classification system. A number of classification systems of stillbirths are known but many of them report about two-third of the stillbirth as unexplained [7]. Classification systems that cannot define the cause of such high proportions of cases cannot be of help in improving the quality of care. When different classification systems had been evaluated, ReCoDe had performed fairly well and is also known as the only classification system known in classifying cause of stillbirths. [7, 8] It is also more suitable for developing country like ours where extensive investigations and postmortem of the fetus may not be possible. Hence, this classification system has been used in the study. In the present study, cause of stillbirths could be identified in 84% of cases as reported by Gardosi, J et al in

2005. [7] Similarly, cause of stillbirths was identifiable in almost 90% of the cases in studies using ReCoDe classification system. [13, 14]

Intrauterine growth restriction was the major cause of stillbirths (22%) followed by congenital anomalies (15%) and hypertensive disorders of pregnancy (14%) in our study. Similar observation was made in studies using ReCoDe classification system. [7, 14] The fact that other studies [11,12,17] reported IUGR in comparatively fewer stillbirth could be due adoption of different classification in these studies. A hypertensive disorder in pregnancy was the major cause in some of the studies [11-13,16-17]. IUGR and hypertensive disorders were associated closely with stillbirths in a case control study done in Nepal. [9]

Fetal growth and the blood pressure of mother are two important factors assessed at the time of antenatal supervision. Improved antenatal care with early diagnosis and timely management of these two conditions would definitely assist in decreasing the stillbirth rate.

Congenital anomalies as the cause of stillbirth were found in 15% of our cases. Other studies also reported slightly lower figures [11-14,16]. Congenital anomalies diagnosed were neural tube defects (anencephaly, hydrocephalus), cardiac anomalies, duodenal atresia, gastrochiasis all of which could have been diagnosed early in gestation. All these anomalies were diagnosed on ultrasound and some also after delivery like anencephaly and gastrochiasis. As most of the women were not booked or booked only at health posts with no facility for detailed anomaly scan in pregnancy; late diagnosis of these lethal anomalies contributed in the stillbirths. A role of quality antenatal care can be emphasized here as well. Nayak SR et al reported congenital anomalies in 32% of antepartum fetal deaths as autopsy was

conducted in their study [18]. It can be inferred that postmortem study of the stillborn can help in finding the cause in many cases where cause cannot be identified.

Intrapartum asphyxia accounted for 7% of cases of stillbirth similar to another study. [17] Ajini et al and Parihar et al reported intrapartum asphyxia in fewer cases. [13,14] Intrapartum care could be improved in order to lower occurrences of intrapartum accidents and therefore decrease fresh stillbirths due to intrapartum asphyxia.

The most common secondary code for stillbirth classification were asphyxia, hypertension, and oligohydranios as in another study [13]. Asphyxia was the main secondary condition seen in our study also appears to be a preventable condition that can be achieved by proper antenatal and intrapartum care.

Most of the stillbirths in our study were preventable. Prevention of the stillbirth can be achieved by improved antenatal care and intrapartum management.

### **Conclusion**

The stillbirth rate was 22 per 1000 births. Low level of education, lack of quality antenatal care, multiparity, low gestational age and birth weight and male sex of fetus were factors associated with stillbirth. The cause of stillbirth was identified in 84% of the cases; intrauterine growth restriction (22%) followed by congenital anomalies (15%) and hypertensive disorders (14%) were the main causes of stillbirths.

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