The causes of early neonatal death in Sulaimani Intensive Care Unite at Maternity Teaching Hospital between Jan 2016 - Feb 2017

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Abstract: *Early neonatal death refers to all deaths of liveborn infants occurring on or before the first seven days of life. There is a shortage of research on the specific causes of early neonatal death. This study has been conducted in order to assess causes of early neonatal death in Sulaimani's Neonatal Intensive Care Unit at Maternity Teaching Hospital. Information was obtained retrospectively from the patients' medical records, including (Mother and neonate socio-demographic, Maternal, Fetal and labor causes of death). Generally, this study found that in 2016 out of total 18.573 recorded delivery, 168 early neonatal deaths were analyzed from January 2016 to February 2017. However, this number was declined in comparison to the data of 2015, which estimated around 244 early deaths out of 21.142 total births. The mean age of mothers was ranged (28.22 ±7.69), 73.2% of neonate mothers were multi gravid with 67.3% of them delivered through normal vaginal, The majority of early neonate death was happening in the mean expected date delivery of (28.64 ± 2.90) weeks, with mostly weighing 700- 1.10 gm. Regarding the maternal causes, more than a quarter of the mother had Preeclamptic toxemia followed by (25% antepartum hemorrhage, 22.6% diabetes, respectively), In terms of the fetal causes, more than three-quarter of neonate were dead because of prematurity and the majority 85.2% were deceased because of the respiratory distress syndrome. Almost no labor causes. The study also found that there is a significant association between gravidity, mode of delivery and maternal cause in p value < 0.05. However, that relationship was not found to fetal cause. Moreover, there is also no significant relationship between fetal cause and (Age of mother, Expected date delivery and fetal weight) in p-value > 0.05 accept the gender of the neonate. In conclusion, some factors affecting early neonatal death have been identified in this study special care is essential for these children in order to reduce their mortality rates.*

Keywords: early neonatal death, preterm death, stillbirth, maternal cause, neonatal cause, NICU

1. INTRODUCTION

Any liveborn infant death occurring on or before the first seven days of life is called early neonatal death [1]. Therefore, the first 7 days of the infant life accounts as the most critical period, which, the neonate might face many problems and diseases [2]. The majority of death is occurring during this time period, which estimated around three quarters of the neonatal deaths [3] .Moreover, WHO (2016) reported that globally every year, 45% of all children under 5 years occur within the first month of life [4]. The majority of the neonatal death has taken place in the developing countries because of the lack adequate access to health care [5]. Further, In Iraq WHO (2010) reported that about 42% of the infant death happen in the neonatal period [6]. Therefore, it is important to understand the main causes of death in early neonate life in order to provide an appropriate action and intervention plan to reduce the mortality rate [7].

Early neonatal death used as a key indicator of the maternal health problem, so there is a significant relationship between high risk pregnancy and neonatal outcome. As a consequence, any obstetric complications before or during birth are more likely contributing to these deaths [8]. Depending on the consistent recording of the pregnancy outcome, WHO reported that globally, preterm birth is the leading cause of neonatal death and estimated at 1 million deaths at 2013. In addition, over 184 countries, preterm birth contributes to 5%-18% of all neonatal deaths [9]. In many cases, the cause of premature labor cannot be identified. However, there are certain health conditions in the mother that increase the risk of preterm labor such as a mother with diabetes, heart disease, kidney disease and hypertension [10]. Further, according to the March of Dimes, if the mother is (16 years old or younger) or older (35 years old or older), is more likely to deliver preterm baby [11]. African Americans have a higher incidence, as do women who lack access to prenatal health care [12].

There are also neonatal causes of death, such as low birth weight, intrauterine growth retardation, congenital anomaly and R.H isoimmunization [13], reflecting the poor nutrition, preceding and smoking during pregnancy, certain infections, such as urinary tract and amniotic membrane infections, history of preterm deliveries weakened cervix and early dilation (cervical incompetence), preeclampsia after 20 weeks (elevated blood pressure and protein in the urine) and finally premature rupture of the placenta (placenta previa). Furthermore, The earlier born baby, the highest risk of having brain damage, blindness, hearing lost, cerebral palsy and also developmental delay. Despite, after delivery they suffered from respiratory distress syndrome, brain damage, hypoglycemia, neonatal sepsis, pneumonia and anemia, which might cause a sudden death [14].

Obstructed labor and fetal malpresentation, are also remain as a common cause of perinatal death in the absence of obstetric care. Birth asphyxia and trauma often occur together during labor. In the most severe cases, the baby dies during birth or soon after, due to damage to the brain and other organs. Less severe asphyxia and trauma will cause disability [15].

Neonatal intensive care unit (NICU) is a special unit used to manage all the neonate baby who weighs less than normal and they also have a serious health problems, which they require a long stay in the hospital [16].

To reduce the chance of having an early neonatal death, it is important to emphasize on the prenatal care and encourage mothers to visit the health center regularly as standard [17]. Furthermore, educate them to eat a high quality diet before and during pregnancy, drink lots of water every day and stop smoking [18]. To prevent the premature birth, there are medications if given early enough, which might slow or stop labor, progesterone hormone supplements also can prevent premature labor in some women. In addition, corticosteroids may also help the baby's lungs and brain to mature more quickly during the final weeks of pregnancy [19].

1.1. Aim

The aim of this study is to assess the causes of early neonatal death at Sulaimani's Neonatal Intensive Care Unit at Maternity Teaching Hospital from Jan 2016 - Feb 2017, This aim will address the following objectives.

1.2. Objectives

- Determine the mother and neonate socio-demographic data

- Estimate the most common maternal causes of early neonatal deaths

- Find out the most common neonatal and labor causes of early neonatal deaths

- Investigate the effects of different risk factors like (mother's age, neonate gender, EDD, birth weight and causes of death

2. METHODS AND MATERIALS

This retrospective based study was carried out in the Neonatal Intensive Care Unit at Sulaimani's Maternity Teaching Hospital for the period of one year from first Jan 2016 to first of Feb 2017. The main sample of this study involved 168 deaths, which consists of all early neonatal death find in the NICU in one year. A well-structured questionnaire was used to record information about the patient information such as: mother and neonate socio demographic data, which includes (mother's age, expected date delivery (week), gender, birth weight, gravidity and mode of delivery). To find the causes of early neonatal death, this study records the available maternal, neonatal and labor causes of death. Additional information was also obtained from the Obituary record of the deceased baby. Permission was taken from the department of health and also from an authorized person at the maternity hospital in order to review the patient information in our study. Data was analyzed using package known as Statistical Package for Social Science 21.0. Descriptive statistics such as (frequency, percentage, mean and standard deviation) were used in order to describe the data. Fisher's exact test was used to find the relationship between the variables of study and F-test were used to determine the association between socio-demographics of the patients with variables of the study.

2. RESULTS

The main sample of this study involved 168 patients, who were selected from the total labor in Sumanai's NICU from January 2016 to February 2017. The sample was stratified by mother and neonate socio-demographic data, maternal, neonatal and labor causes of early neonatal death and some other causes of the premature death.

Table (1): Distribution of mother and neonate socio-demographic characteristics

Characteristics	Frequency n=168	Percent %100	Mean ± S.D
Age of mother			
Less than 20	12	7.1	28.22 ± 7.69
20-29	87	51.7	
30-39	56	33.3	
40 and more	13	7.9	
Gender of baby			
Male	82	48.8	
Female	86	51.2	
Expected date delivery			
(20-24) W	12	7.1	28.64 ± 2.90
(25-29) W	94	56.0	
(30-34) W	58	34.5	
(35-40) W	4	2.4	
Birth Weight			
Less than 0.700	8	4.8	1.17 ± 0.36
0.700 - 1.10	79	47.0	
1.10-1.50	29	17.3	
1.50 and more	52	31.0	
Gravidity			
Primi	45	26.8	
Multi	123	73.2	
Mode of delivery			
Vaginal	113	67.3	
C/S	55	32.7	

Table (1) shows that the mean age of the mothers was (28.22 ± 7.69) years, ranging from less than 20 to 40 and more, of the total study samples: 51.7% of the mothers were aged between 20 to 29; followed by 33.3% were aged between 30 to 39;

7.9% were aged 40 and more; merely 7.1% were aged less than 20 years.

The mean expected date delivery of the total sample was (28.64 ± 2.90) weeks, more than half of the neonate 56.0% were delivered between 25 to 29 weeks, followed by 34.5% between 30 to 34 weeks; and a minority of them 2.4% were delivered between 20 to 24 weeks.

In terms of birth weight: the mean and standard deviation of neonate weight were (1.17 ± 0.36), almost half of the neonates 47.0% weight were between 0.700 to 1.10 grams with the highest frequency compare to others; followed by 31.0% of them were 1.5 grams and more; 17.3% of them were between 1.10 gram to 1.50 grams and only 4.8% of them were weight less than 0.700.

In terms of gravidity, 73.2% were multi gravida and 26.8% were primi. Regarding the mode of delivery, majority 67.3% of the neonates were delivered through vagina and 32.7% were delivered by C/S.

Table (2): Causes of early of neonatal death

Characteristics	Frequency n=168	Percent 100%
Maternal cause		
Antepartum Haemorrhage (APH)	42	25.0
Pre-eclamptic Toxemia (PET)	52	31.0
Diabetes mellitus (D.M)	38	22.6
Rapture uterus	36	21.4
Neonatal Cause		
R.H isoimmunization	19	11.3
Congenital anomaly	9	5.4
Intrauterine growth Retardation (IUGR)	6	3.6
Prematurity	134	79.7
Labor Cause		
Brith injury	2	1.2
Brith asphyxia	2	1.2
Muconeumaspiration	0	0.0
None of them	164	97.6

Table (2) shows causes of early neonatal death.

In terms of maternal cause Pre eclamptic toxemia of the neonate mothers estimated as a higher range 31.%, followed by 25.0% antipurtum hemorrhage, 22.6% with Diabetes Millitus and 21.4% were rupture uterus.

Regarding neonatal causes, of the total samples: Majority of the early neonatal death 79.7% were prematur; followed by 11.3% R.H isoimmunization; 5.4% congenital anomaly and 3.6% IUGR. Moreover, 97.7% of the total sample did not have any labor cause, otherwise, minority 1.2% of them had birth injury and birth asphyxia.

Table (3): causes of premature death

Premature causes	Frequency	Percent
RDS	114	85.2
Septesimea	10	7.4
Hydropes fetalis	5	3.7
Twin	5	3.7
Total	134	100.0

It can be seen in the table (3) the causes of premature death, which: accounts as 134:168 early neonatal deaths. 85.2 % died as a result of RDS, which were estimated the majority compared to other causes; 7.4% died because of septesimea; 3.7% died causing by Hydropes fetalis; 3.7 % died causing by twine.

Table (4): Relationship between patients' criteria and neonatal causes

Variables	F-test for comparing (neonatal cause)	p-value	Sig.
Age	0.65	0.58	NS
EDD	0.63	0.593	NS
Gender of baby	3.417	0.019	S
Neonate Weight	1.016	0.387	NS

As shown in the table (4) that there were no statistically significant relationship between neonatal cause and Age of mother, Expected date delivery, and neonatal weight because the p-value of these were greater than the common alpha 0.05. However, there were statistically significant relationship between neonatal cause and gender of the baby because p- value were less than the common alpha 0.05.

Table (5) shows that there is a statistically significant relationship between Mode of delivery and maternal cause because the p< 0.05 in relation to maternal cause among the study sample

Table (6) indicated that there is no statistically significant relationship between gravidity and neonatal cause because the p-value were greater than the common alpha 0.05.

Table (5): association between Mode of delivery and Maternal Cause

Mode of delivery	Maternal Cause				
	A. P. H	P. E. T	D. M	Rupture uterus	Total
Vaginal	32 19.1%	35 20.8%	22 13.1%	24 14.3%	113 67.3%
C/S	10 5.9%	17 10.2%	16 9.5%	12 7.1%	55 32.7%
Total	42 25.0%	52 31.0%	38 22.6%	36 21.4%	168
Fisher's exact	13.042		**P-value**		0.038

Table (6): association between Gravidity and neonatal Cause

Gravidity	Neonatal Cause				
	R.H isoimmuni-zation	Congenital anomaly	IUGR	Premature	Total
Primi	6 3.5%	4 2.3%	0 0.0%	35 21.0%	45 26.8%
Multi	13 7.8%	5 3.1%	6 3.6%	99 58.7%	123 73.2%
Total	19 11.3%	9 5.4%	6 3.6%	134 79.7%	168
Fisher's exact	3.87			**P-value**	0.27

Table (7): association between Mode of delivery and neonatal Cause

Mode of delivery	Neonatal Cause				
	R.H isoimmu ni-zation	Congenital anomaly	IUGR	Premature	Total
Vaginal	13 7.7%	4 2.4%	3 1.8%	93 55.4%	113 67.3%
C/ S	6 3.6%	5 3.0%	3 1.8%	41 24.3%	55 32.7%
Total	19 11.3%	9 5.4%	6 3.6%	134 79.7%	168
Fisher's exact	3.23		**P-value**		0.35

It is clear in the table (7) that there is no statistically significant relationship between Mode of delivery and neonatal Cause because the p-value were greater than the common alpha 0.05.

3. DISCUSSION

A retrospective - quantitative study was chosen in order to find out the main causes of early neonatal death among all the neonate delivered at Sulaimania Maternity Teaching Hospital. This study found that in 2016 out of total 18.573 recorded delivery, 168 of them were dead in the early neonatal period. However, this number was declined in comparison to the data of 2015, which estimated around 244 early neonatal deaths.

Regarding the distribution of mother and neonatal demographic data, the current study found that the higher early neonatal death 51.7% were happening amongst mothers aged between 20 to 29; merely 7.1% were aged less than 20 years and the mean age of the mothers was (28.22 ± 7.69) years. Therefore, there is no significant association between mother's age and neonatal causes of death, In contrast to this result [20], conducted a systematic review and pointed to the impact of the young mother of having a low birth weight infant and preterm labor, which strongly related to the risk of early neonatal death, estimated as a higher risk of mortality rate in this present study. A retrospective cohort study conducted to determine the risk of the maternal age on the neonatal death, stated that in mother more than 44 years, immediate delivery is recommended to decrease the risk of losing the baby, this indicates that there is an effect of maternal age on the neonatal death [21].This study also observed differences between gravidity (primi and multi gravid) in terms, of early neonatal death and reported that almost three quarters of the early deaths happened in multi gravid, with mostly delivered through normal vagina. This finding is supported by the retrospective study was carried out to determine the effect of mode of delivery on the perinatal mortality, found that cesarean section was not impacted on the neonatal death [22].

Our analysis stated that generally maternal and obstetric complication were significantly associated with child mortality. Pre- eclamptic Toxemia is a major cause of maternal, macerate and neonate death [23,5]. This current study found that Pre-eclamptic Toxemia (PET) were the main primary obstetric events that led to early neonatal deaths in pregnancies. These results are consistent with the literature reviewed to diagnose and manage the obstetric pre- eclapmsia [24]. found that preclamsia to be a disorder that considerably reflects on a neonatal outcome and leads them to death if they are not delivered earlier.

With regard to the neonatal causes of early neonatal death as documented in the hospital records, prematurity accounts as a high risk of death in the newborn and are the leading cause of death [25]. The current study is in line with this fact and found that more than three quarters of the early neonatal deaths is prematurity who delivered between 25-29 weeks of gestation with low birth weight as the majority we re weighed between 0.700 - 1.10 gm. This finding supported by the descriptive, exploratory cross-sectional study obtained the information from the hospital mortality record system in Cuiabá, indicated that Prematurity and low

birth weight were the leading causes of early neonatal death, thus, they recommended improving a quality of prenatal care [1]. Further, In a prospective hospital based study was conducted to identify the impact of low birth weight on neonatal mortality [26], also in consistent with our findings stated that LBW increase the risk of neonatal deaths. Therefore, reduction and prevention of preterm birth with low birth weight through access to the advance quality of pre and postnatal care, which, might play an active role in reducing the neonatal mortality [27].

In terms of the labor cause of early neonatal deaths, the present study illustrated that majority 97.7% of the total sample did not have any labor cause. This could be argued by a prospective descriptive observational study conducted in the delivery room and adjacent neonatal area, seen that birth asphyxia and failure to resuscitation is the leading causes of neonatal death more than prematurity and low birth weight. Consequently, this analysis indicates that there is almost a great labor care in our hospital delivery room with regular antenatal visits and resuscitation, which might reduce antenatal mortality. Therefore, to promote, support and protect safe birth, it is important to use the standard maternity care to make the safe birth to the mother and their baby [28].

4. CONCLUSION

Some factors affecting early neonatal death have been identified in this study, which includes (Maternal and neonatal demographic data, maternal and neonatal causes). This study found that generally, the number of early neonatal deaths in 2016 was declined in comparison to the data from 2015. In terms of mother and neonatal demographic data, this study concluded that the predominance of mother's age were (25-29) years old., The majority of early neonate death was happening in the mean expected date delivery of (28.64 ± 2.90) weeks, with mostly weighing 700- 1.10 gm. More than a quarter of the mother had Preeclamptic toxemia. Regarding neonatal causes, Prematurity and low birth weight were the leading cause of early neonatal death. Respiratory distress syndrome was the commonest primary cause addressed, among all premature deaths. Better quality of prenatal and antenatal care are recommended and also educating mother regarding some dangerous signe of the neonatal death. Further, more observational studies will be needed to observe the causes of death and quality of care offered to the neonate baby in NICU.

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Biography

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Pary believes that nurses and doctors should work together in order to improve the quality of medical and nursing care.

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Pary has 8 publications nationally and internationally and received the first prize award at the Research Methods conference in one of the universities of England.

Pary is interested in reading scientific books, enjoys swimming at her, spare time and loves traveling.

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Second author

Layla A. Mohamad has worked as an assistant lecturer at Sulaimani Technical Institute, Midwifery department, working with students to increase their scientific level practically.

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Nasren A. Kareem has worked as an assistant lecturer and head of Anesthesia Department at Sulaimani Technical Institute.

Nasren certified teacher in maternity and gynecology Nursing.

Nasren believes that the healthy pregnancy can lead to the healthy baby and always instruct mother about, prenatal, antenatal and postnatal care.

Nasren do spend her free time reading a nursing book, listening to music and spending time with her family.

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