Neonatal mortality trends at tertiary care hospital, Kuppam

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Abstract

Background: Neonatal mortality rate is one of the indicators which depict the health care status of that country. Hospital based mortality and morbidity pattern helps in improving the quality of health care delivery in the hospital. **Objectives:** (1) To determine the neonatal mortality trend over 36 months and various causes of neonatal mortality. (2) To determine the risk factors for early and late neonatal deaths. **Study Design**: Retrospective study. **Study Population**: Neonates admitted to Neonatal Intensive Care Unit (NICU). **Study Duration:** From January 2015 to December 2017. **Methodology:** Systematically and retrospectively charts were reviewed using data recorded in Neonatal Intensive Care Unit (NICU) at PESIMSR, Kuppam, Andhra Pradesh. **Results**: A total of 2089 neonates were admitted to Neonatal Intensive Care Unit (NICU) between January 2015 to December 2017. Average Neonatal Mortality Rate (NMR) between January 2015 to December 2017 was 7.5%. Early neonatal deaths were 35(49.3%) and Late Neonatal death was 36(50.7%). Common causes of death were neonatal sepsis, perinatal asphyxia and prematurity and its complications. **Conclusions**: Implementing appropriate strategies to improve antenatal, perinatal and neonatal care helps in preventing perinatal asphyxia, neonatal sepsis and prematurity and its complications, which further helps in reduction of neonatal mortality, in-turn decreases the infant mortality and under 5 mortality rate.

Key words: Neonate, Early Neonatal Death, Late Neonatal Death, Neonatal Mortality Rate, NICU

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Introduction

The first 28 days of life, the neonatal period, is the most vulnerable period for a child's survival. Neonatal mortality rate is the ratio of the number of deaths in first 28 days of life to the total number of live births occurring in the same population during the same period. Neonatal mortality and morbidity are the major global burden with 2.5 million babies dying each year during neonatal period and developing country like ours is no exception to this, neonatal deaths continue to pose as health problem [1]. Neonatal mortality rate is one of the indicators which depict the health care status of that country.

As an overall, child mortality rate can be bought down if infant mortality is reduced, therefore it is clear that strategies to reduce neonatal mortality are essential in reaching the Millennium Development Goal 4 to reduce the child mortality [1].

India presents a unique context to study neonatal mortality for several reasons. First, despite the rapid economic growth that has occurred in India over the last two decades, the neonatal mortality rate continues to remain high (900,000 in 2007), and India accounts for nearly 28% of the global deaths among newborn children [2].

Secondly, figures from India's four national representative National Family Health Survey data sets show that neonatal deaths have increased as a proportion of under-five deaths from 45% in NFHS-1 (1992) to 60% in NFHS-4 (2015-16) [15].

This is despite the fall in under-five mortality from 109/1000 live births in NFHS-1 (1992) to 50/1000 live births in NFHS-4 (2015/16) [3,4]. This indicates that while India has made remarkable progress in reducing deaths outside of the neonatal period, neonatal death rates have remained static, and are thus rising in proportion to total under-five deaths [3, 4, 5].

A retrospective study was done to review the total number of admissions, deaths & discharges at PESMISR, KUPPAM between January 2015 to December 2017. This study establishes the baseline admission trends and the effect of gestational age and birth weight on mortality.

Materials and Methods

Study Type: Retrospective observational study

Study Place: Neonatal Intensive Care Unit (NICU) at PESIMSR, Kuppam, Andhra Pradesh

Study Duration: From January 2015 to December 2017.

Studymethod and collection of data: Systematically and retrospectively charts were reviewed using data recorded in Neonatal Intensive Care Unit (NICU). Extracted data included gestational age (GA), birth weight (BW), gender, mortality and cause of death. Gestational age assessments were done either by

modified Ballard Score or by LMP. Birth weight were measured at birth, SGA, AGA & LGA were defined as birth weight <10th centile, 10th to 90th centile and more than 90th centile respectively as per growth charts. Mortality was further divided into early neonatal deaths and late neonatal deaths. Early neonatal period is the age of newborn less than 7 days.

Neonatal infections were diagnosed mainly on clinical basis, sepsis screen and positive blood cultures. Perinatal asphyxia was defined as per AAP & ACOG criteria [6]. Hypoxic Ischemic Encephalopathy staging was done as per Sarnat & sarnat staging [7]. Preterm babies with respiratory distress having positive radiological features were diagnosed as Hyaline Membrane Disease (HMD).

Inclusion criteria: Neonates admitted to NICU.

Exclusion criteria: Neonates discharged against medical advice.

Results

A total of 2089 neonates (Table 1) were admitted to NICU between Jan, 2015 to Dec, 2017. The total term babies were 1514 (72.5%) out of which 31.3% were out born & 68.7% were inborn. Total pre term babies were 575 (27.5%), among which 25.6% & 74.4% were out born and inborn respectively. Neonatal Mortality rate were 9.3%, 7.5% and 5.8% in 2015, 2016 & 2017 respectively (Table 2). Primary causes of death in our NICU (Figure 1) were Sepsis (36.6%), Perinatal Asphyxia (30.9%) and Prematurity and its complications (23.9%). Other causes of mortality were complex congenital heart diseases (4.3%) and congenital anomalies (4.3%). Early neonatal deaths were (Table 3) 35 (49.3%) and primary causes of mortality among them were (Table 4) Perinatal asphyxia (31.4%), Neonatal Sepsis, Prematurity and it's complications and others like congenital Heart disease, congenital anomalies. Late neonatal deaths (Table 3 and 4) were 36 (50.7%) and causes were neonatal sepsis (47.2%), perinatal asphyxia and prematurity and its complications.
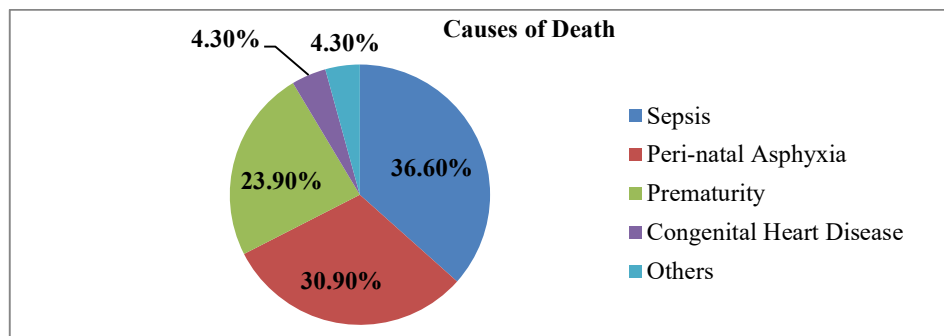
Fig.-1: Various causes of deaths among Neonates

Table-1: Year-wise admission details

Year	Term		Pre-term		Total
	Out-born	**In-born**	**Out-born**	**In-born**	
2015	144	375	34	112	**665**
2016	129	401	47	171	**748**
2017	201	264	66	145	**676**
Total	**474**	**1040**	**147**	**428**	**2089**

Table-2: Year-wise Neonatal Mortality Rate (NMR of Inborn Neonates).

Year	NMR (%)
2015	9.3
2016	7.5
2017	5.8

Table-3: Depicting Early and Late neonatal deaths.

Year	Early Neonatal Death (F,M)	Late Neonatal Death (F,M)
2015	8 (3,5)	17 (6,11)
2016	16 (7,9)	3 (0,3)
2017	11 (6,5)	16 (6,10)

(F- Female, M- Male)

Table-4: Association of factors with Early & Late Neonatal Deaths.

Variable	Neonatal Deaths		p-value
	Early	**Late**	
Sex			
Male	19	24	0.285
Female	16	12	
Gestational age			
Pre-term	20	23	0.560904
Term	15	13	
Birth weight			
< 1.5 kg	12	10	0.378318
1.5 – 2.49 kg	10	16	
2.5 & above	13	10	
Mode of Delivery			
Vaginal	23	18	0.180193
Caesarian	12	18	
Place of Delivery			
In born	26	24	0.481889
Out born	9	12	
Cause of Death			
Neonatal Sepsis	9	17	**0.036***
Perinatal asphyxia	11	11	
Prematurity	9	8	
Others	6	0	

*'p' value significant less than < 0.05

Discussions

The neonatal mortality pattern varies from time to time and place to place even in the same place and its helpful in determining the effectiveness of maternal and child health care services. Our study is intended to know the mortality trends over 36 months in our NICU and this in turn helps in improving the quality of services. There were 6,869 deliveries in our hospital from January 2015 to December 2017, of which 1468 (21%) neonates needed NICU admission. Among the 1468 neonates, 70.8% of them were term and 29.2% were preterm. The outborn admissions were 621 neonates, out which, 76.3% were term and 23.6% were preterm. Early neonatal deaths were 35 (49.3%) & late neonatal deaths were 36 (50.7%). The commonest cause of death in our NICU was due to sepsis (36.6%), perinatal asphyxia (30.9%) and prematurity and its complications (23.9%).

As mentioned in multi-country analysis by Lawn JE et al., 85% of the world's 3.1 million neonatal deaths were due to the same above three mentioned causes [8]. The average neonatal mortality rate in our hospital for inborn babies was 7.5% for 1000 live births between January 2015 and December 2017. Year wise Neonatal Mortality rate were 9.3%, 7.5% and 5.8% in 2015, 2016 & 2017 respectively. This also shows that as the years progressed the quality of neonatal care has also improved in our Neonatal Intensive Care Unit over the years. The neonatal mortality rate in India is 28 and in Andhra Pradesh are 10 & 31, in urban & rural area respectively [9].

Of 2089 neonates admitted to NICU, 1978 (94.68%) neonates were discharged home, when compared to other studies which have reported 81% and 82% discharges [10, 11]. During this study period there were 71 deaths. Mortality profile was calculated after excluding DAMA and referred neonates as their outcome was unknown. The proportional Preterm mortality was more than that of term babies. In our study, out born deaths (Table 4) were significantly higher than that of inborn babies which are similar to other studies [10, 11]. The probable cause for increased in number of out born deaths could be due to delayed referrals. The major causes of death were neonatal sepsis (36.6%), perinatal asphyxia (30.9%) and prematurity (23.9%). RDS and MAS were the main respiratory causes of death in Preterm and term babies respectively. In our study, death due to neonatal sepsis was 36.6% which is almost equivalent to the study of Patil R et al., [12]. Perinatal Asphyxia contributed to around 31% in our study which is similar to that of study done by Mani Kant et al [13]. In our study we also concluded that neonatal sepsis was significant cause of death in late neonatal deaths, with significant 'p'value (Table 4).

A study by Klaauw and Wang et al [14], argued that the impacts of socioeconomic and environmental factors on child mortality varies with child's age and found that impacts are more prominent immediately after birth. It shows that the probability of dying in the first month is higher in the male child. In our study we found that male neonates had higher mortality during early neonatal period when compared late neonatal period.

Conclusions

Perinatal asphyxia, prematurity and neonatal sepsis are major causes of morbidity and mortality. This hospital based study may partially reflect the existing health problem in the community. The above mentioned are the important causes of neonatal mortality all over the world. Implementing appropriate strategies to improve antenatal, perinatal and neonatal care helps in preventing perinatal asphyxia, neonatal sepsis and prematurity and its complications, which further helps in reduction of neonatal mortality in-turn decreases the infant mortality and under 5 mortality.

What this study adds to existing knowledge?

Sepsis, perinatal asphyxia, prematurity and its complications are the major causes of morbidity and mortality, if appropriate strategies are implemented to improve antenatal, perinatal and neonatal care, then we can significantly reduce the overall morbidity and mortality further.

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