

Clinical profile of neonates admitted to a neonatal intensive care unit at a referral hospital in South India

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Abstract

Introduction: A country's health is measured in terms of infant mortality. The neonatal care was revolutionized after the inception of NHM. The reduction in mortality can be achieved by systematic approach to common diseases prevailing in the area and by applying the uniform treatment protocol to bring down the mortality. So, this study aims at identifying the morbidity and mortality pattern in a tertiary care referral center. **Methodology:** Hospital data based retrospective study from Jan' 2016 to Dec' 2017. **Results:** Total of 7108 neonates was analyzed. Male: female ratio was 1.25:1. Low birth weight babies accounted 48.91% and pre-term babies around 54.63%. Of this predominant were late preterm babies. Jaundice requiring photo therapy (21.97%) topped the list of morbidities followed by sepsis (19.27%) and respiratory distress (7.86%). Sepsis (24.93%), RDS (19.95%) and birth asphyxia (18.95%) were the leading causes of mortality. Overall mortality in this study was 11.28%. **Conclusion:** Hyper bilirubinemia, Sepsis and respiratory distress syndrome were the leading causes of morbidity. Neonatal sepsis can be prevented by enforcing strict hand hygiene and aseptic protocols. Low birth weight and prematurity were the significant contributors to morbidity and mortality. Hence antenatal programs to prevent prematurity and low birth weight babies should be strengthened.

Key words: Neonate, Morbidity, Neonatal mortality, Neonatal Intensive Care Unit

Introduction

Neonatal period is the first 28 days of life since birth. It is considered as the most susceptible period for mortality and morbidity [1]. A country's health status is measured in terms of infant mortality [2]. Neonatal mortality accounts for 2/3 rd of the infant mortality [2]. Current Neonatal Mortality Rate (NMR) in India is 34/1000 live births [3]. Tamilnadu stands second lowest with 17/1000 [3]. India contributes to nearly 25% of global neonatal deaths [4]. Even though there is a drastic decline in NMR, Average Annual Rate of Reduction (AARR) is only less with 3.5%. UN Millennium Development Goals 2015 had seen a reduction of 47% of under 5 mortality (U5MR).

Sustainable Development Goal 2030 focuses mainly on reduction in neonatal mortality to achieve U5MR [5]. Seventy five percent of neonatal deaths occur in first week of life [6]. Three major causes (78%) which

contribute to neonatal mortality in developing countries are prematurity & low birth weight, neonatal infections and birth asphyxia [7]. In India, the neonatal care saw a revolution under the auspices of National Health Mission (NHM) [8]. After reduction in NMR, the goal is to reduce the morbidity of neonates by disease specific intervention. So, identifying the pattern of medical illness in an area will help the health care providers to plan service priorities [9].

Population specific, systematic comprehensive strategies are needed to reduce the morbidity and mortality at national level [10]. So, this study aims at the identification of factors contributing to neonatal mortality and morbidity in our hospital.

Methodology

Study Design and Period: It is a hospital data based retrospective study from January 2016 to December 2017 for a period of 2 years. **Study Place:** It was done

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in Neonatal Intensive Care Unit (NICU) of Government Mohan Kumaramangalam Medical College Hospital, Salem in Tamilnadu state. **Inclusion Criteria:** All babies admitted in our NICU under 28 days of life. **Exclusion Criteria:** Neonates Left against Medical

Advice and referred to higher center without definitive diagnosis were excluded. **Statistical Analysis-** was done using Microsoft Office Excel®. The standard case definitions of National Neonatology Forum were used. The results were analyzed for frequency.

Results

A total of 7108 neonates formed the study group after exclusion of neonates left against medical advice and neonates referred to higher centers. Out of them 4366 (61.42%) were intramural and 2742 (38.57%) were extramural admissions. Among these 55.52% were male and 44.47 % were female and the Male: Female sex ratio was 1.25:1. More than 50% babies weighed above 2.5 kg and low birth weight babies constituted 48.91%. Among this more than one third (38.33%) are late pre terms and more than 50% are preterm neonates. Average duration of hospital stay was 6.67 days and more than one third of the babies stayed for more than 7 days.

Table:1: Profile of babies admitted.

Characteristics	Intramural	Extramural	Total
Number of babies in the study group	4366 (61.42%)	2742(38.58%)	7108
Sex distribution			
Male	2363 (54%)	1584 (57%)	3947(55.53%)
Female	2003 (46%)	1158 (43%)	3161(44.47%)
Birth weight distribution			
>2.5 kg	2211 (50.6%)	1420 (51%)	3631(51.08%)
1.5-2.499 kg	1783 (40.8%)	1030 (37.56%)	2813(39.57%)
1-1.499	283 (6.48%)	221 (8.05%)	504(7.09%)
<1kg	89 (2.03%)	71 (2.58%)	160(2.25%)
Gestational age			
>37 weeks	1910 (43.74%)	1315 (47.95%)	3225(45.37%)
34-37 weeks	1711 (39.18%)	1014 (36.98%)	2725(38.33%)
<34 weeks	745 (17.06%)	413 (15.06%)	1158(16.29%)
Average duration of hospital stay			
<1 days	72 (1.64%)	140 (5.10%)	212(2.98%)
1-3 days	1521 (34.83%)	896 (36.70%)	2417(34%)
4-7 days	1382 (31.66%)	804 (29.32%)	2186(30.75%)
>7 days	1391(31.85%)	902 (32.89%)	2293(32.24%)
Outcome			
Discharged	3953(90.68%)	2353(85.81%)	6306 (88.72%)
Death	413 (9.35%)	389 (14.18%)	802(11.28%)
Morbidity profile			
Respiratory distress syndrome (RDS)	352 (8.06%)	207(7.54%)	559(7.86%)
Meconium aspiration syndrome (MAS)	186 (4.26%)	125(4.55%)	311(4.37%)
Transient tachypnea of newborn (TTNB)	315(7.21%)	84(3.06%)	399(5.61%)
Other causes of respiratory distress	82 (1.87%)	27 (0.98%)	109(1.53%)
Birth asphyxia/ HIE	272 (6.22%)	256 (9.33%)	528(7.42%)
Major congenital malformations	197(4.51%)	322 (11.74%)	519(7.30%)
Sepsis	801(18.34%)	569(20.75%)	1370(19.27%)
Pneumonia	6 (0.13%)	14 (0.51%)	20(0.28%)
Meningitis	1 (0.02%)	7 (0.25%)	8(0.11%)
Jaundice requiring phototherapy	1216 (27.85%)	346 (12.57%)	1562(21.97%)
Hypoglycemia	5 (0.11%)	5 (0.18%)	10(0.14%)
Others	933 (21.36%)	780 (28.44%)	1713(24.09%)

Table-2: Mortality profile.

Diseases			
	Inborn(n=413)	Outborn (n=389)	Total (n=802)
RDS	102 (24.69%)	58 (14.91 %)	160(19.95%)
MAS	14 (3.38%)	11 (2.82%)	25(3.11%)
Birth asphyxia/HIE	82 (19.85%)	70(17.99%)	152(18.95%)
Sepsis	103 (24.93%)	97 (24.93%)	200(24.93%)
Major congenital malformation	41 (9.92%)	89 (2.87%)	130(16.20%)
Prematurity	45 (10.89%)	32 (8.22%)	77(9.60%)
Others	26 (6.29%)	32 (8.22%)	58 (7.23%)
Age at death			
<1 days	28 (6.77%)	41 (10.53%)	69(8.60%)
1-3 days	176 (42.6%)	162 (41.64%)	338(42.14%)
4-7 days	104 (25.18 %)	82 (21.07%)	186(23.19%)
>7 days	105 (25.42%)	104 (26.73%)	209 (26.05%)
Birth weight			
>2.5 kg	84 (20.33%)	143 (37.01%)	227(28.30%)
1.5-2.499 kg	169 (40.92%)	136 (34.96%)	305(38.02%)
1-1.499	112 (27.11%)	75(19.28%)	187(23.31%)
<1 kg	48 (11.62%)	35 (8.99%)	83(10.34%)
Gestational age			
Preterm	317(76.75%)	204(52.44%)	521(64.96%)
Term	95 (23%)	180 (46.27%)	275(34.28%)
Post term	1 (0.24%)	5(1.28%)	6(0.74%)

Analyzing the morbidity pattern, Jaundice requiring phototherapy (27.85%) was the leading cause requiring admission in the intramural group followed by sepsis (18.34%) and respiratory distress (8.06%). Among extra mural admissions, sepsis (20.75%) is the leading cause followed by jaundice requiring phototherapy (12.57%), major congenital malformation (11.74%) and birth asphyxia (9.33%). Considering both the groups together, jaundice requiring phototherapy (21.97%) was the commonest morbidity followed by sepsis (19.27%) and respiratory distress (7.86%). All other causes were almost equal in incidence in both groups.

The mortality pattern in the study group is shown in table: 2. In the study group, 88.72% were discharged and 11.28% died. Intramural deaths were 9.45% and 14.18% were extra mural deaths. Analyzing the mortality pattern, sepsis was the leading cause of death both among intramural (24.93%) and extramural (24.93%). Second common was respiratory distress (19.95%) which was closely followed by birth asphyxia (18.95%).

Early neonatal deaths were 73.95% and 26.05% deaths occurred after 7 days. Term deaths constituted around one third (34.28%) and two third of the deaths (64.96%) were preterm. Neonatal deaths among low birth weight babies were 71.7%.

Discussion

In our study we observed a high percentage of LBW admissions– 49.31% in Intramural and 48.19% in Extramural. Sick neonates are referred to our NICU from nearby districts and as the low birth weight babies are prone to serious complications, this could be the reason for having a high incidence of low birth weight neonates in this study. In other studies, it varied

between 20% and 55%. India accounts for 40% of the world's LBW babies [11-13]. These babies need immediate neonatal care to prevent death and hence focus should be on prevention of LBW babies [14]. The male preponderance in this study is similar to other studies [15-17]. This may be because of vulnerability of male neonates and gender preference.

In the present study, sepsis and jaundice requiring phototherapy were the leading morbidities observed. Other studies from other places in India presented sepsis and prematurity as the leading cause for admissions [18]. The National Neonatal Perinatal Database shows sepsis (36%) as the most common morbidity responsible for admission followed by prematurity (26.5%) and perinatal asphyxia (10%) [19].

Neonatal sepsis was the cause of morbidity in 19.27% of admitted neonates. Different hospital-based studies have found the incidence of neonatal sepsis ranging from 17.7% to 70% [11, 12, 14].

In the present study, we observed an incidence of 7.42% birth asphyxia admissions. Various other studies reported incidence ranging from 12.7% to 38.7% [20, 21]. The incidence of hyper bilirubinemia is 21.97% in our study. This higher incidence is due to the fact that this study was conducted in a tertiary care referral unit. A similar high incidence of 35% was also observed in a study by Simiyu [22].

In this study we observed 11.28% mortality. The mortality in various other studies range from 1.4% to 20.5% [23,24,25]. The mortality rates depend on many factors like obstetric care, location of referral center, pattern of referral cases, availability of equipments and skilled manpower.

About three fourth of deaths were early neonatal deaths. About 8.6% of deaths were observed within 24 hours of life and 26.05% deaths occurred after 7 days of life. There was no difference between mortality rates among intramural and extramural admissions. In a study by Malik S, the incidence of early neonatal death was 82.16% [26].

Conclusion

In our study sepsis, hyper bilirubinemia and respiratory distress syndrome were the leading causes of morbidity. Neonatal sepsis can be prevented by enforcing strict hand hygiene and aseptic protocols. Low birth weight and prematurity were the significant contributors to mortality. Hence antenatal programs to prevent prematurity and low birth weight babies should be strengthened. The higher incidence of birth asphyxia and the mortality associated with it in the extramural admissions in the present study warrants strategies to be implemented to prevent birth asphyxia in the referring centers.

What is already known?

Prematurity, Low birth weight, Sepsis and birth asphyxia were the common causes of neonatal morbidity and mortality.

What this study adds

Neonatal hyperbilirubinemia is also an important indication for admission in NICU.

In this study the deaths among term babies admitted extramurally were more than the intramurally admitted babies. But the reverse was observed among preterm babies. Other studies observed significantly increased death rates among extramurally admitted babies in both term and preterm groups [8,26]. This may be due to the fact that this NICU is a tertiary care referral centre to which other hospitals refer sick neonates at a late stage of the disease. In this study there was no difference in the death rates among intramural and extramural groups due to sepsis.

But in other studies the proportion of deaths due to sepsis in the out born babies was more than inborn babies [8,26]. In this study death rate due to birth asphyxia was also similar in both intramural and extramural groups. In other studies a higher death rate due to birth asphyxia was observed in extramural group [8,26]. The maternity wing of this hospital is a tertiary care referral centre to which many high risk mothers are referred and hence the incidence of birth asphyxia is more in intramurally admitted neonates.

The mortality among Extreme Low Birth Weight babies in this study is 54.24%. In a study by Modi et al, the mortality among ELBW babies was 62.96% [27].

Congenital malformations were seen in 7.3% in our study. Similar incidence was observed in other studies [28-30]. In developed countries most of neonatal deaths were attributed to birth defect and extreme prematurity, low birth weight neonates, while in developing countries 85% of neonatal death occur due to perinatal asphyxia, prematurity, low birthweight and sepsis. Studies have showed low cost interventions and strategies with essential newborn care and training can reduce these major causes of death by more than 50% [31].

Limitations of this study: As this is a retrospective study, cause of death was determined by the information in the official case records. As this was a government hospital-based study and as most of our patients hail from a low socio-economic status, the results of our study may not be reflecting the actual burden of the disease in the community. Maternal case details were not studied in this study.

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