

# Pattern of Neonatal Diseases and Hospital Outcome at a Teaching Hospital in Mandya

Sridhar PV<sup>1</sup>, Sandeep M<sup>2\*</sup>, Thammanna PS<sup>3</sup>

<sup>1</sup>Associate Professor, Department of Paediatrics, Mandya Institute of Medical Sciences, Mandya, India

<sup>2</sup>Assistant Professor, Department of Paediatrics, Mandya Institute of Medical Sciences, Mandya, India

<sup>3</sup> Professor, Department of Paediatrics, Mandya Institute of Medical Sciences, Mandya, India

**\*Address for Correspondence:** Dr. Sandeep M, Assistant Professor, Department of Paediatrics, Mandya Institute of Medical Sciences, Mandya, India

**E-mail:** [drsandym27@gmail.com](mailto:drsandym27@gmail.com)

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## ABSTRACT

**Background:** The neonatal period is unquestionably the most hazardous period of life. The perinatal and neonatal periods are short but represent the most critical phases of human life. India accounts for nearly 30% of neonatal mortality in the world. Morbidity profiles and mortality caused by developing and developed nations are very different. The present study was carried out to find the morbidity pattern and outcome of neonates admitted to the NICU at the tertiary care teaching hospital, Mandya.

**Methods:** A retrospective case record analysis of neonates admitted to the NICU of our institution between January 2018 and December 2019 was conducted after obtaining Institutional ethics committee approval. Data was recorded in predesigned proforma and analyzed using SPSS version 22.

**Results:** 1904 neonates were admitted in 2018 and 2372 neonates in 2019. Male predominant admission pattern was observed. The major cause for hospitalization was neonatal sepsis, followed by respiratory distress syndrome, neonatal jaundice and perinatal asphyxia. Overall, the NICU mortality rate in 2018 was 6.51% (124/1904) and in 2019, it was 5.1%. The most common etiology for mortality was respiratory distress syndrome. Neonates with birth weight <1000 grams had poor outcomes.

**Conclusion:** The present study identified neonatal sepsis, respiratory distress syndrome secondary to prematurity, perinatal asphyxia and neonatal jaundice as the leading causes of morbidities in neonates. Respiratory Distress Syndrome accounts for nearly 50% of all mortality, followed by neonatal sepsis and Hypoxic ischemic encephalopathy. Appropriate measures at various levels of care for mother and baby can prevent many morbidities and subsequent mortality.

**Key-words:** Neonatal morbidity, Neonatal mortality, Sepsis, Respiratory distress syndrome, Perinatal asphyxia

## INTRODUCTION

Around 26 million babies are born annually in India, nearly 20% of global births. Almost 0.75 million die during the neonatal period in India. India has the dubious distinction of having the highest number of annual neonatal deaths among all countries in the world, accounting for nearly 30% of global deaths, and In comparison to maternal deaths and deaths under five, it is higher.<sup>[1,6]</sup>

Without a doubt, the most dangerous time is during the newborn stage. Though brief, the prenatal and neonatal stages mark the most crucial time in a person's life.<sup>[2]</sup>

The time from birth to 28 days of age is known as the neonatal phase, during which there is a significant and continuous systemic change from the uterine environment to the outside world. Before seven days of age is referred to as the early neonatal phase, while seven days of life and up to 28 days of age is referred to as the late neonatal era.

The nations of Sub-Saharan Africa and South Central Asia are responsible for the greatest number of newborn deaths. Seventy-five percent of newborn deaths worldwide occur in ten countries, with Nigeria, China, India, and Pakistan at the top of the list.<sup>[3]</sup> The greatest Neonatal Mortality Rate (NMR) is seen in India.

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The 2019 NMR rate was estimated to be 22 per 1000 live births, although it varies by state.<sup>[4]</sup> Prematurity, hypoxia at birth, and sepsis are significant global causes of newborn mortality in low-income nations. On the other hand, in affluent nations, congenital abnormalities and premature birth are the main causes of death.<sup>[3,5]</sup>

It is crucial to understand the numerous factors that contribute to neonatal deaths to create a strategy to lower the neonatal mortality rate and prioritize resources. Most deaths in the community are caused by low birth weight (LBW), infections, and birth asphyxia/birth trauma. The goal of the current study was to determine the morbidity pattern and results of newborns hospitalized at the tertiary care teaching hospital in Mandya's Neonatal Intensive Care Unit (NICU).

## MATERIALS AND METHODS

This retrospective hospital case record-based study was conducted in the Neonatal Intensive Care Unit, Department of Paediatrics, Mandya Institute of Medical Sciences, Mandya. Before the start of the study, Institutional ethics committee approval was obtained.

**Study Period:** January 2018- December 2019.

**Sample Size:** All the neonates admitted in the study period.

**Study Design-** Retrospective data analysis

**Inclusion Criteria-** All neonates admitted to the Neonatal Intensive Care Unit (NICU).

## RESULTS

The total number of live births at the institution in 2018 was 7491, and in 2019 was 7789. There were 1398 inborn neonates admission and 506 outborn neonates admission in 2018, 1836 inborn admission and 536 outborn neonates admission in 2019 (Table 1). The number of male neonates admitted was more than

Neonates delivered at our institution were considered as inborn and neonates delivered at other hospitals and referred here were considered as outborn.

**Exclusion criteria-** Neonates whose case records are incomplete due to discharge of neonate against medical advice (DAMA) and referral to other centers were excluded from the study.

**Data Collection-** The Neonatal Intensive Care Unit (NICU), Department of Paediatrics, Mandya Institute of Medical Sciences, Mandya, Karnataka, India is the site of the current study. A review and analysis of all the neonates admitted to the NICU throughout the study period was conducted using their retrospective case records. Neonates' records meeting the inclusion and exclusion criteria were added to the analysis. All pertinent information from the case file was gathered and put into a proforma that had already been created.

**Statistical Analysis-** In this way, information was gathered, combined, and input into an MS Excel spreadsheet. For the analysis, SPSS version 22 was utilized. Frequency and percentage were used to express categorical data. The study employed the chi-square test to detect variations in frequency between different groups. Statistical significance was attained when the p-value was less than 0.05.

**Ethical Approval-** The Human Ethical Committee of the Department of Paediatrics, Mandya Institute of Medical Sciences, Mandya, India, approved the above study.

female neonates in inborn and outborn admission groups during 2018 and 2019. Applying one sample Chi-square test to see the difference in frequency distribution in male and female neonates admitted to NICU was statistically significant in both 2018 and 2019 ( $p < 0.001$ ).

**Table 1:** Gender distribution of admitted neonates

Year	Inborn admission			Out-born admission		
	Male N (%)	Female N (%)	Total	Male N (%)	Female N (%)	Total
2018	783(56.01)	615(43.99)	1398	290(57.31)	216(42.69)	506
2019	1015(55.28)	821(44.72)	1836	309(57.65)	227(42.35)	536

The distribution of admitted neonates according to gestational age and birth weight is summarized in Table 2. Most neonates were of gestation age > 37 weeks and

birth weight >2500 grams. 31 neonates admitted in 2018 and 39 neonates admitted in 2019 were of birth weight <1000 grams.

**Table 2:** Distribution of admitted neonates based on Gestational age, Birth weight

Parameter		2018 N (%)	2019 N (%)
Gestational Age	> 37 weeks	1041 (54.67)	1508 (63.58)
	34- 37 weeks	657 (34.51)	691 (29.13)
	< 34 weeks	206 (10.82)	173 (7.29)
Birth weight	> 2500 gm	1061 (55.72)	1389 (58.56)
	1500- 2499 gm	717 (36.66)	846 (35.67)
	1000- 1499 gm	95 (4.99)	98 (4.13)
	< 1000 gm	31 (1.63)	39 (1.64)

Major causes of the morbidity for admission to NICU were neonatal sepsis, followed by respiratory distress syndrome, neonatal jaundice, hypoxic-ischemic encephalopathy and meconium aspiration syndrome.

Major congenital malformation was the reason for hospitalization in 3.89% of neonates in 2018 and 2.91 % of neonates in 2019 (Table 3).

**Table 3:** Morbidity profile of neonates admitted to NICU

Morbidity Profile	2018	2019
Respiratory Distress Syndrome	374 (19.64)	413 (17.41)
Meconium Aspiration Syndrome	141 (7.4)	84 (3.54)
Respiratory Distress (Other causes)	85 (4.46)	98 (4.14)
Hypoxic Ischemic Encephalopathy	259 (13.6)	257 (10.83)
Sepsis	481 (25.26)	766 (32.29)
Neonatal Jaundice	321 (16.86)	519 (21.88)
Congenital Malformations	74 (3.89)	69 (2.91)
Intrauterine Growth Restriction	92 (4.83)	79 (3.33)
Hypoglycemia	16 (0.84)	22 (0.93)
Others	61 (3.2)	65 (2.74)
Total	1904	2372

In 2018, there were 124 documented deaths in admitted neonates (91 Inborn and 33 Outborn) and in 2019, there were 121 documented deaths in admitted neonates (83 Inborn and 38 Outborn). Overall, the NICU mortality rate in 2018 was 6.51% (124/1904) and in 2019, it was 5.1% (121/2372). The mortality rate difference between inborn neonates (6.51%) and outborn neonates (6.52%) was identical. However, the mortality rate difference in 2019 between inborn neonates (4.52%) and outborn neonates (7.09%) was statistically significant ( $p=0.017$ ).

The difference in the mortality rate among male and female neonates was not significant statistically.

The most common cause of mortality in both years was Respiratory Distress Syndrome, accounting for nearly 50% of all mortality, followed by neonatal sepsis and Hypoxic ischemic encephalopathy (Table 4). Survival of neonates with weight <1000 grams was very poor, followed by those with 1000 grams to 1499 grams.

**Table 4:** Cause of death among admitted neonates

Cause of Death	2018 N (%)	2019 N (%)
Respiratory distress syndrome	61 (49.19)	63 (52.07)
Meconium Aspiration Syndrome	10 (8.06)	5 (4.13)
Hypoxic Ischemic encephalopathy	23 (18.55)	23 (19.01)
Sepsis	24 (19.36)	20 (16.53)
Congenital Malformations	6 (4.84)	10 (8.26)
Total	124	121

## DISCUSSION

Precise baseline data on etiological factors for neonatal mortality and morbidity are limited in India. These vary from place to place and have drastically changed due to availability and improvement in neonatal care. These details are important for multiple reasons. This retrospective study was undertaken to determine the morbidity and mortality profile of neonates admitted to the NICU at our institution.

In our study, 1904 neonates were admitted in 2018, and 2372 were admitted in 2019. The majority of neonates admitted were inborn neonates. Male predominance admission was observed in our study. Similar Male predominance of admission is recorded in a study by Gunasekhar *et al.* [7], Kumar *et al.* [8], and Roy *et al.* [9]. In the year 2018, 45.33% of neonates admitted were preterm, 43.28% of neonates admitted were low birth weight babies, and in the year 2019, 36.42% of neonates admitted were preterm, and 41.44% of neonates admitted were low birth weight babies. This may probably be due to poor maternal nutrition, health conditions and low socio-economic status.

In the year 2018, the most common morbidity for hospitalization was neonatal sepsis (25.26%), followed by Respiratory distress syndrome (19.64%), Neonatal jaundice (16.86%) and perinatal asphyxia (13.6%). During 2019, the most common morbidity for hospitalization was neonatal sepsis (32.29%), followed by neonatal jaundice (21.88%), Respiratory distress syndrome (17.41%) and perinatal asphyxia (10.83%). A study conducted by Gaucham *et al.* in Nepal reported that neonatal Jaundice, sepsis and perinatal asphyxia are the commonest indications for admission to NICU. [10] In contrast, a study by Agarwal *et al.* [11] has reported that the most common morbidity factor is low birth weight and prematurity, followed by neonatal sepsis and RDS. Admission secondary to perinatal asphyxia reduced in the year 2019 as compared to 2018, and the percentage

of HIE admission is similar to that reported by Malagi NAN *et al.* [12]

Mortality rate also showed a decline in 2019 (5.1%) compared to 2018 (6.51%). The mortality rate observed in our study is lower than Agarwal *et al.* [11] and Prasher *et al.* [13] Most common cause of mortality in our study was due to respiratory distress syndrome secondary to prematurity followed by sepsis and perinatal asphyxia. Prematurity and its subsequent complications were the cause of death for maximum neonates in studies by Verma *et al.* [14], Patil *et al.* [15], and Kumar *et al.* [16]. In contrast to our study, Sasmal *et al.* [17] have observed that Congenital malformations were the leading cause of neonatal mortality in their 5 years retrospective study of their NICU admission.

## CONCLUSIONS

From the observations of this study, neonatal sepsis, respiratory distress syndrome secondary to prematurity, perinatal asphyxia (hypoxic ischemic encephalopathy) and neonatal jaundice are the leading causes of morbidities in neonates. Even with advancements in neonatal care, these factors continue to be major factors for neonatal morbidity. The commonest cause of neonatal mortality was respiratory distress syndrome secondary to prematurity, followed by sepsis and perinatal asphyxia. Many morbidities and subsequent mortality can be prevented by improving the care of expecting mothers, good antenatal care, timely intervention, measures to reduce preterm delivery and care of neonates at centers with appropriate facilities.

## CONTRIBUTION OF AUTHORS

**Research concept-** Sandeep M, Sridhar PV, Thammanna PS

**Research design-** Sridhar PV, Thammanna PS

**Supervision-** Sridhar PV, Thammanna PS

**Materials-** Sandeep M, Sridhar PV, Thammanna PS

**Data collection-** Sandeep M

**Data analysis and Interpretation-** Sandeep M

**Literature search-** Sandeep M

**Writing article-** Sandeep M

**Critical review-** Sridhar PV, Thamanna PS

**Article editing-** Sandeep M

**Final approval-** Sridhar PV, Thamanna PS

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