

Morbidity Pattern and Hospital Outcome of Neonates Admitted in a Tertiary Care Teaching Hospital, Mandya

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Abstract

Introduction: Neonatal period is a very vulnerable period of life due to many problems. India alone contributes to about 25% of neonatal mortality around the world. In spite of advances in perinatal and neonatal care, neonatal mortality is still high in developing countries. This study was undertaken to study the disease pattern and outcome of neonates admitted to the neonatal intensive care unit (NICU) of a tertiary care teaching hospital, Mandya.

Study Design: Retrospective study of medical records for 1 year (January 2014-December 2014).

Materials and Methods: Neonates admitted to NICU, Mandya Institute of Medical Sciences, Mandya during the study period were included in the study; the data were recorded in predesigned proforma. The data were analyzed using appropriate statistical tool.

Results: A total of 1487 neonates were admitted to NICU during the study period, 54 neonates left against medical advice, 79 were referred to other centers hence excluded from analysis. The ratio of the males to female admitted was 1.45:1. The major causes of morbidity were neonatal sepsis (28.8%), respiratory distress syndrome (RDS) (23.85%), birth asphyxia (17.72%), neonatal jaundice (7.02%), and meconium aspiration syndrome (5.47%). In this study, overall mortality rate was 7.16%. Most of the deaths were due to RDS (43.3%), birth asphyxia (37.11%), neonatal sepsis (8.25%), and congenital anomalies (8.25%). Neonates with birth weight <1500 g had poor outcome compared to neonates with birth weight more than 2500 g.

Conclusion: This study identified prematurity, low birth weight, neonatal sepsis, and birth asphyxia as major causes of morbidity and RDS, birth asphyxia as the major contributors to the neonatal mortality. Improving antenatal care, maternal health and timely referral of high risk cases to tertiary care hospital will help to improve neonatal outcome.

Key words: Birth asphyxia, Neonatal morbidity, Neonatal mortality, Neonatal sepsis

INTRODUCTION

The neonatal period is a very vulnerable period of life due to many problems, which in most of the cases is preventable.^{1,2} Of the 25 million babies born in India every year 1 million die, India alone contributes to 25% of neonatal mortality around the world. As per the National Family Health

Survey-3 report, current neonatal mortality rate (NMR) in India is 39 per 1000 live births, neonatal deaths accounts for nearly 77% of all infant deaths (57/1000) and nearly half of under-five child deaths (74/1000).³ Preterm and low birth weight (LBW) babies are at increased risk of perinatal mortality and morbidity.⁴ As per the report sheet published in the Lancet, the major direct causes of neonatal mortality are pre-term birth (27%), infection (26%), asphyxia (23%), congenital anomalies (7%), others (7%), tetanus (7%), and diarrhoea (3%).⁵ There are very scanty data which are available regarding the neonatal mortality and morbidity pattern in India. Advancement in perinatal and neonatal care have significantly helped in reducing NMR in developed countries, but the mortality and morbidity are still high in developing countries.⁶ To

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apply preventive strategies, we should have the data on morbidities which are claiming the neonatal life. This study was undertaken to study the disease pattern and outcome of neonates admitted to the neonatal intensive care unit (NICU) of a tertiary care teaching hospital located in Mandya, Karnataka, India.

MATERIALS AND METHODS

This hospital based retrospective study was carried out in the NICU, Department of Pediatrics, at Mandya Institute of Medical Sciences, Mandya, Karnataka, India, for a period of 1 year from January 2014 to December 2014. The Institutional Ethical Committee approved the study protocol. Our NICU caters to the population of Mandya district and neighboring district of Ramnagara. Approximately 6000 deliveries are conducted per year in the hospital; the majority of patients belong to below poverty line income group. Our NICU has bed strength of 17, facility for phototherapy, surfactant administration, exchange transfusion, and ventilation are available.

A retrospective case record review and analysis of all the newborn babies admitted to the NICU during the study period was done and neonates satisfying inclusion and exclusion criteria were included in the study.

Inclusion Criteria

All neonates admitted to NICU.

Exclusion Criteria

Neonates who left hospital against medical advice (LAMA) and neonates who were referred due to non-availability of beds and surgical intervention were excluded from the study.

These neonates were categorized as inborn if delivered in the Medical college Hospital and as outborn if born outside. The data were recorded in predesigned Proforma.

Statistics

Data collected were compiled and entered in MS Excel spreadsheet and analyzed using appropriate statistical tools in Open Epi statistical software, version 2.3.1.

RESULTS

A total number of babies admitted to NICU during the study period was 1487 of which 54 neonates LAMA and 79 neonates were referred to other centers hence these neonates were excluded from the study. A total of 1354 neonates were included for the data analysis. Out of this

59.23% (802) were male and 40.77% (552) were females, ratio is 1.45:1. Of the total admissions 71.71% (971) were inborn neonates and 28.29% (383) were outborn neonates (Table 1). 52.21% (707/1354) neonates had birth weight >2500 g, 40.55% (549/1354) of neonates belonged to LBW category (1500-2499 g), 6.06% (82/1354) of neonates belonged to very LBW (VLBW) group (1499-1000 g), 1.18% (16/1354) of neonates were of extremely LBW (ELBW) category (<1000 g). On applying one sample Chi-square test to see the observed frequency distribution in males and females neonates overall admitted to NICU, it was found to be statistically significant ($P < 0.001$).

The major causes of the morbidity for admission to NICU were neonatal sepsis (28.8%), respiratory distress syndrome (RDS) (23.85%), hypoxic ischemic encephalopathy (17.72%), neonatal jaundice (7.02%) and meconium aspiration syndrome (5.47%) (Table 2).

In this study, overall NICU mortality rate was 7.16% (97/1354). The mortality rate in inborn neonates was 6.69% (65/971) whereas mortality rate in outborn neonates was 8.36% (32/383), the difference in mortality rate between inborn and outborn neonates was statistically insignificant ($P = 0.284$). The mortality in males was 6.86% (55/802), in females was 7.61% (42/552), the difference in the mortality rate among male and female neonates was statistically insignificant ($P = 0.596$). The major causes for mortality were RDS (43.4%), hypoxic ischemic encephalopathy (37.11%), and neonatal sepsis (8.25%) (Table 3).

Table 1: Sex distribution of admitted neonates

Sex	Inborn (%)	Outborn (%)	Total (%)
Male	573 (59.01)	229 (59.79)	802 (59.23)
Female	398 (40.99)	154 (40.21)	552 (40.77)
Total admission	971 (71.71)	383 (28.29)	1354 (100)

Table 2: Morbidity profile of neonates admitted to NICU

Morbidity profile	Inborn (%)	Outborn (%)	Total (%)
Respiratory distress syndrome	227 (23.38)	96 (25.07)	323 (23.85)
Meconium aspiration syndrome	47 (4.84)	27 (7.05)	74 (5.47)
Respiratory distress (other causes)	31 (3.19)	11 (2.87)	42 (3.1)
Hypoxic ischemic encephalopathy	176 (18.13)	64 (16.71)	240 (17.72)
Sepsis/pneumonia/meningitis	285 (29.35)	105 (27.42)	390 (28.8)
Neonatal jaundice	65 (6.69)	30 (7.83)	95 (7.02)
Congenital anomaly	48 (4.94)	10 (2.61)	58 (4.29)
Intrauterine growth restriction	51 (5.25)	21 (5.48)	72 (5.32)
Hypothermia	12 (1.24)	9 (2.35)	21 (1.55)
Hypoglycemia	6 (0.62)	7 (1.83)	13 (0.96)
Others	23 (2.37)	3 (0.78)	26 (1.92)
Total	971 (100)	383 (100)	1354 (100)

NICU: Neonatal intensive care unit

On comparing survival among different birth weight groups (Table 4), it was seen that there was statistically significant difference between VLBW and normal birth weight group ($P \leq 0.05$), and between ELBW and normal birth weight group ($P \leq 0.05$). However, there was no statistically significant difference in survival among LBW and normal birth weight group ($P = 0.368$).

It was observed that the duration of time between admission and death was <1 day in 42.27% of deaths (41/92) followed by 1-3 days in 40.21% of deaths (39/97).

DISCUSSION

This study was conducted to delineate the morbidity pattern, outcome and factors leading to mortality of neonates admitted to NICU of tertiary care teaching hospital. Precise data regarding mortality and morbidity pattern for NICU admission are useful for many reasons.

In our study, total of 1354 neonates were admitted of which 71.71% neonates were inborn and rest were outborn babies (28.29%), male preponderance of admission to NICU was noted similar admission pattern has been seen in study conducted by Roy *et al.*⁷ 47.79% of neonates admitted had LBW and 28.58% of neonates admitted were preterm baby. This may probably be due to poor maternal health condition, low socio-economic status and less visits to health care facility. Similar rate of LBW and preterm baby admission has been reported by study conducted

by Garg *et al.* in New Delhi.⁸ According to the UNICEF "The state of the World's Children 2010" report, 28% neonates are born with LBW in India.⁹ The most common specific morbidity for admission was neonatal sepsis (28.8%) followed by RDS (23.85%) and hypoxic ischemic encephalopathy (17.72%). A study conducted by Gaucham *et al.* in Nepal reported that neonatal jaundice, sepsis and perinatal asphyxia as being commonest indication for admission to NICU.¹⁰ According to national neonatal-perinatal database (NNPD) sepsis (36%) is the most common morbidity responsible for admission followed by prematurity (26.5%) and perinatal asphyxia (10%).¹¹ Birth asphyxia is an important cause of neonatal morbidity and mortality, its incidence in our study is 17.72% which is similar to findings of Chandra *et al.*¹² Neonatal sepsis acts as an important cause for morbidity and mortality especially among LBW and preterm babies.

Mortality rate observed in our study is 7.16% is lower than that of the mortality rates observed in study conducted by Rakholia *et al.*¹³ The most common causes of mortality were RDS (43.3%), birth asphyxia (37.11%), and sepsis (8.25%). Similar pattern of outcome has been reported by study conducted by Rashid *et al.*¹⁴ In contrast the study report published by ICMR reports sepsis (32.8%) as the major cause for neonatal mortality followed by birth asphyxia (22.3%) and prematurity (16.8%).¹⁵ In the study done at JIPMER, sepsis was the cause for death in 52.3% of neonates followed by birth asphyxia and injuries (29.23%).¹⁶ Majority of deaths in our study was attributable to RDS and birth asphyxia; this may probably be due to poor antenatal care, malnourished pregnant women, less availability of health facility, delivery by untrained professional and delay in referral from peripheral hospitals. Birth weight <1500 g were associated with high number of mortality in preterm neonates.

CONCLUSION

According to this study neonatal sepsis, RDS and birth asphyxia are leading causes of morbidities in newborn babies. In spite of many advances in neonatal care above factors still continue to be the leading causes of morbidity in neonates. Common causes of neonatal mortality were RDS, birth asphyxia, neonatal sepsis and congenital anomalies. The majority of morbidities and subsequently the mortalities can be prevented by improving antenatal care, maternal health, timely intervention, referring at appropriate time to tertiary care centers for high risk cases, preventing preterm deliveries and care of neonates at centers with facility. This study has some limitations, as this was a hospital based retrospective study, the cause of death was determined using the data available in case

Table 3: Comparison of deaths among inborn and outborn neonates

Cause of neonatal death	Inborn (%)	Outborn (%)	Total (%)
Respiratory distress syndrome	26 (40)	16 (50)	42 (43.3)
Sepsis/meningitis/pneumonia	6 (9.23)	2 (6.25)	8 (8.25)
Meconium aspiration syndrome	2 (3.08)	1 (3.13)	3 (3.09)
Hypoxic ischemic encephalopathy (birth asphyxia)	25 (38.46)	11 (34.37)	36 (37.11)
Congenital anomaly	6 (9.23)	2 (6.25)	8 (8.25)
Total	65 (100)	32 (100)	97 (100)

Table 4: NICU outcome in different birth weight group

Birth weight	NICU admission (%)	Deaths (%)	Percentage of death is each group (%)
More than 2500 g	707 (52.21)	32 (32.99)	4.53
LBW (1500-2499 g)	549 (40.55)	31 (31.96)	5.65
VLBW (1000-1499 g)	82 (6.06)	22 (22.68)	26.83
ELBW (<1000 g)	16 (1.18)	12 (12.37)	75
Total	1354 (100)	97 (100)	-

NICU: Neonatal intensive care unit, LBW: Low birth weight, VLBW: Very low birth weight, ELBW: Extremely low birth weight

record sheets, Neonates who LAMA and those who were referred to other centers due to non-availability of NICU beds and needed surgical intervention were excluded from study and could hence modify the results. In our study, we did not divide the deaths into early and late neonatal period. As the majority of the patients presenting to us belong to low socio-economic status, the results from this study cannot be a complete reflection of the problem in the community as a whole.

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