

Clinical study of morbidity and mortality pattern of neonatal intensive care unit at a tertiary hospital

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Abstract

Background: Neonatal life is the most important and hazardous, also requires proper care of pediatrician for illness. Present study was aimed to study the disease pattern and outcome of neonates admitted to the neonatal intensive care unit (NICU) of a tertiary care teaching hospital. **Material and Methods:** Present study was hospital based, prospective, descriptive, observational study, conducted in newborns admitted during the study period, delivered in our hospital. **Results:** During study period 1440 neonates were studied. Majority were male (61.94 %), vaginally delivered (69.79 %), full term (37-40 weeks) (60.63 %) and were admitted for 3-7 days (56.94 %). Majority of neonates were admitted for low birth weight (LBW) (37.64 %), prematurity (15.49 %), neonatal jaundice (10.69 %), respiratory distress syndrome (RDS) (9.17 %), neonatal sepsis (6.18 %), perinatal asphyxia (4.51 %), hypoxic ischemic encephalopathy (HIE) (3.40 %), macrosomia (2.92 %), pneumonia (2.22 %), hypothermia/ hyperthermia (1.32 %) and others (6.46 %). Majority of neonates were discharged uneventfully (77.99 %), followed by discharge against medical advice (10.69 %), discharged on request (3.26 %) and referred for further management (1.53 %). Mortality was noted in 94 neonates (6.53 %). Common causes of mortality were low birth weight / prematurity (58.51 %) followed by neonatal sepsis (9.57 %), perinatal asphyxia (8.51 %), hypoxic ischemic encephalopathy (5.32 %), meconium aspirational syndrome (5.32 %), respiratory distress (4.26 %), pneumonia (3.19 %), congenital malformation (3.19 %) and metabolic complications (2.13 %). **Conclusion:** Low birth weight, prematurity, birth asphyxia, neonatal sepsis and Need for neonatal resuscitation were significantly associated with mortality. Prevention, early identification and appropriate management can significantly reduce neonatal mortality and morbidity.

Keywords: Low birth weight, prematurity, birth asphyxia, neonatal sepsis, mortality, morbidity.

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INTRODUCTION

Neonatal life is the most important and hazardous, also requires proper care of pediatrician for illness. 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.¹ Globally, the cause of neonatal deaths varies, based upon the facilities available and quality of health care provided by the local health centers. Low birth weight, preterm births, length of stay of the neonatal intensive care unit, low 5min APGAR score, hyperthermia, and initiation of feeding were predictors of neonatal death among infants admitted to the neonatal intensive care units of public hospitals.² Neonatal deaths can be largely preventable. An analysis indicated that available interventions can reduce the three most common cause of neonatal mortality preterm, intrapartum, and infection-related deaths by 58%, 79%, and 84%, respectively.³ Neonatal intensive care is cost intensive and rational use of neonatal unit services by targeting its

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utilization for the very low birth weight neonates and maintenance of community based home-based newborn care is required.⁴ Present study was aimed to study the disease pattern and outcome of neonates admitted to the neonatal intensive care unit (NICU) of a tertiary care teaching hospital.

MATERIAL AND METHODS

Present study was hospital based, prospective, descriptive, observational study, conducted in Department of Paediatrics, Dr Ulhas Patil Medical College and Hospital, Jalgaon, India. Study duration was of 1 year (January 2020 to December 2020). Study was approved by institutional ethical committee. All newborns admitted during the study period, delivered in our hospital were considered for present study. Study was explained to parents and an informed consent was taken for participation. Basic demographic data, age, gender, birth weight, gestational age, mode of delivery, cause of admission, date of

admission and discharge, admission diagnosis, whether the baby died or was discharged in a satisfactory clinical state, treatment received, etc. was collected in proforma. Detailed history, physical examination and relevant diagnostic investigations were also considered. WHO definitions were used for Term, Preterm, Low Birth Weight (LBW), Very Low Birth Weight (VLBW), Extreme Low Birth Weight (ELBW) and congenital malformation. Meconium aspiration syndrome was neonates diagnosed on basis of history, clinical and radiological findings. Neonatal jaundice was diagnosed after assessment of serum bilirubin and in pathological zone as per AAP charts. Sepsis was diagnosed by clinical and appropriate lab screening tests. Admission diagnoses were categorized according to primary diagnosis such as prematurity, respiratory distress, infection, etc. Data was collected and compiled using Microsoft Excel, analysed using SPSS 23.0 version. Statistical analysis was done using descriptive statistics.

RESULTS

During study period 1440 neonates were studied. Majority were male (61.94 %), vaginally delivered (69.79 %), full term (37-40 weeks) (60.63 %) and were admitted for 3-7 days (56.94 %). According to birthweight (in grams), neonates were divided as extremely low birthweight (<1000) (11.60 %), very low birthweight (1000-1499) (17.78 %), low birthweight (1500-1999) (23.75 %), low birthweight (2000-2499) (12.22 %), normal (2500-3999) (31.74 %) and macrosomia (>4000) (2.92 %).

Table 1: Characteristic of the neonates admitted in NICU

Characteristic	No. of cases (n= 1440)	Percentage
Sex		
Male	892	61.94%
Female	548	38.06%
Male: female ratio	1.627737226	
Type of delivery		
Vaginal	1005	69.79%
LSCS	401	27.85%
Instrumental	34	2.36%
Gestational age		
Preterm (< 37 weeks)	458	31.81%
Full term (37-40 weeks)	873	60.63%
Post term (> 40 weeks)	109	7.57%
Length of stay in NICU		
1-2 days	432	27.64%
3 - 7 days	467	56.94%
> 7 days	541	32.36%
Birthweight (in grams)		
Extremely Low Birthweight (<1000)	167	11.60%
Very Low Birthweight (1000-1499)	256	17.78%
Low Birthweight (1500-1999)	342	23.75%
Low Birthweight (2000-2499)	176	12.22%
Normal (2500-3999)	457	31.74%
Macrosomia (>4000)	42	2.92%

In present study, majority of neonates were admitted for low birth weight (LBW) (37.64 %), prematurity (15.49 %), neonatal jaundice (10.69 %), respiratory distress syndrome (RDS) (9.17 %), neonatal sepsis (6.18 %), perinatal asphyxia (4.51 %), hypoxic ischemic encephalopathy (HIE) (3.40 %), macrosomia (2.92 %), pneumonia (2.22 %), hypothermia/hyperthermia (1.32 %) and others (6.46 %).

Table 2: Morbidity profile of neonates

Condition	No. of cases (n= 1440)	Percentage
Low Birth Weight (LBW)	542	37.64%
Prematurity	223	15.49%
Neonatal Jaundice	154	10.69%
Respiratory Distress Syndrome (RDS)	132	9.17%
Neonatal Sepsis	89	6.18%
Perinatal Asphyxia	65	4.51%
Hypoxic Ischemic Encephalopathy (HIE)	49	3.40%
Macrosomia	42	2.92%
Pneumonia	32	2.22%
Hypothermia/ hyperthermia	19	1.32%
Others	93	6.46%

Majority of neonates were discharged uneventfully (77.99 %), followed by discharge against medical advice (10.69 %), discharged on request (3.26 %) and referred for further management (1.53 %). Mortality was noted in 94 neonates (6.53 %)

Table 3: Outcome

Outcome	No. of cases (n= 1440)	Percentage
Discharge	1123	77.99%
Discharge Against Medical Advice	154	10.69%
Death	94	6.53%
Referred	22	1.53%
Discharged on request	47	3.26%

Common causes of mortality were low birth weight / prematurity (58.51 %) followed by neonatal sepsis (9.57 %), perinatal asphyxia (8.51 %), hypoxic ischemic encephalopathy (5.32 %), meconium aspirational syndrome (5.32 %), respiratory distress (4.26 %), pneumonia (3.19 %), congenital malformation (3.19 %) and metabolic complications (2.13 %).

Table 4: Mortality Profile

Cause of Death	No. of cases (n= 94)	Percentage
Low Birth Weight / Prematurity	55	58.51%
Neonatal Sepsis	9	9.57%
Perinatal Asphyxia	8	8.51%
Hypoxic ischemic encephalopathy	5	5.32%
Meconium aspirational syndrome	5	5.32%
Respiratory Distress	4	4.26%
Pneumonia	3	3.19%
Congenital Malformation	3	3.19%
Metabolic complications	2	2.13%

DISCUSSION

Hypothermia, sepsis, and prematurity were the main reasons for NICU admission. Neonates often died within the first 24 hours of age. Implementing a better referral link and timely intervention could decrease neonatal mortality and morbidities due to above reasons.⁵ As per the National Health Family Survey-4, NMR in Maharashtra is 16.2/1000 live births, which is well below the national NMR.⁶ To achieve our commitment toward sustainable developmental goals (SDGs), we should lower neonatal mortality to 12/1000 live births by 2030. Deaths occurring in special neonatal care units (SNCUs) and neonatal intensive care units (NICU) have a major influence on infant mortality. Understanding the causes of death and the modifiable factors associated with death has the potential to decrease neonatal as well as infant mortality.⁷ Agrawal R *et al.*,⁸ studied 450 neonates, for morbidity low birth weight (LBW) (14.4%) and for mortality

LBW/prematurity (56%) were the most common causes. The discharge rate was 64.4%. Good outcome in the form of successful discharge was statistically significant with birth weight ($p=0.000$), gestational age (0.001), length of stay at NICU ($p=0.003$) male sex ($p=0.003$) and feeding of newborn ($p=0.002$) Sridhar PV *et al.*,⁹ studied 1487 neonates, 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. In study by Chandrakala R *et al.*,¹⁰ 1580 neonates were studied. 59.5% were Males, 63% were inborn, 75% were

term babies and 59.5% had normal birth weight. 89.8% were admitted in early neonatal period. Important causes for admission were sepsis (24%), birth asphyxia (23.6%), prematurity and low birth weight care (18.5%), Respiratory problems (13.9%) and hyperbilirubinemia (10.3%). The outcome of the admitted babies showed 83% discharges, 3.7% deaths, 12.2% discharge against medical advice and 1.96% referred to another center. The major causes of mortality were birth asphyxia including hypoxic ischemic encephalopathy (45%), sepsis (27.5%) and respiratory problems (27.5%). The survival of term as well as inborn babies was better than that of preterm and out born neonates respectively. Chintla LP *et al.*,¹¹ studied 1015 babies, almost half 592(58.32%) were born in this hospital(inborn) and 423(41.67%) babies were referred from peripheral hospitals and nursing homes (out born). about 3/4th 767(75.5%) of babies were admitted in the first 24 hours of life. Almost half (53.4%) of the study group were male and 46.6% were female. The chief causes of admission in SNCU were Respiratory Distress Syndrome (40.2%) followed by birth asphyxia (19.1%), sepsis (13.3%), Neonatal Jaundice (9.9%) and prematurity (6.6%). In our study 63.0% patients were discharged, 19.3% had left hospital against medical advice, 10.1% died and 7.6% were referred to other institutions for specialized treatment. Rahman K¹² studied 5649 neonates admitted in SCNU, inborn 3657 (64.7%) and out born 1992 (35.2%). 58.7% of babies were male. Almost equal number of normal weight (50.2%) and low birth weight babies (49.7%) were admitted. Similarly equal number of term (49.4%) and preterm babies (50.5%) were admitted. Birth asphyxia, babies with birth weight below 1800gm requiring special care, neonatal sepsis and jaundice requiring phototherapy were common morbidities requiring admission. Mortality was 11.4% which is higher in out born (14.3%) than inborn (9.9%). Birth asphyxia (53.9%) was the commonest cause of mortality followed by respiratory distress syndrome (RDS) with prematurity (23.2%) and neonatal sepsis (12.4%). Sepsis is higher in out born unit (18.5%) than inborn (7.7%). Highest number of death occurs in early neonatal period (88.5%) and among low birth weight baby (58.7%). G. Hany MW¹³ studied 987 neonates, non-survivors represented 41.9%, whereas survivors represented 58.1%. Results show a statistically significant difference of more deaths with multiple pregnancy, vaginal delivery, mechanical ventilation, sepsis, pneumothorax, CNS problems, hemorrhage, low GA, low birth weight, low Apgar score at 5 min, and low days of NICU admission. Findings from bivariate analysis showed that hemorrhage, mechanical ventilation, pneumothorax, CNS problems, vaginal delivery, and sepsis were significantly associated with less time to death. Cox regression analysis and odd ratio

showed that hemorrhage, sepsis, and pneumothorax have the most effect on mortality, whereas high GA and high Apgar score at 5 min are significant to survival. Simple interventions as care during labour and childbirth and the 1st week of life; and care for the small and sick newborn which if intervened timely can reduce the risk of neonatal deaths in future.¹⁴ Universal implementation of antenatal corticosteroids in preterm labor and use of injection gentamycin along with syrup amoxicillin in infection will prevent the respiratory distress and infections among most of neonates.¹⁵ To address the high neonatal mortality, many cost effective and proven interventions have been implemented in the state like - early initiation of breast feeding, proper umbilical cord care, maintaining temperature of baby, early identification of danger signs and referral, care of low birth weight and premature babies etc. are being delivered through community and facility based programmes.

CONCLUSION

Low birth weight, prematurity, birth asphyxia, neonatal sepsis and Need for neonatal resuscitation were significantly associated with mortality. Prevention, early identification and appropriate management can significantly reduce neonatal mortality and morbidity.

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