To study the morbidity and mortality pattern of outborn neonates admitted in neonatal intensive care unit of Indore

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N ewborn or neonates are infants between birth and first 28 days of life. The newborn period is the most critical phase of life as they are prone to various diseases. The neonatal morbidity and mortality vary in different countries as well as in different areas of the same country. Current neonatal mortality rate in India is 39/1000 live births, and neonatal deaths account for nearly 77% of all infant deaths (57/1000) and nearly half of under-five year child deaths (74/1000) [1]. Preterm and low birth weight (LBW) babies are at increased risk of perinatal mortality and morbidity.

The major causes of newborn deaths in India are pre-maturity (35%), neonatal infections (33%), intrapartum complications/birth asphyxia (20%), and congenital malformations (9%) [1]. Sepsis, prematurity, and birth asphyxia were the major causes for admission in neonatal intensive care unit (NICU). All these etiologies are preventable up to some extent and, if detected earlier, can be effectively treated to reduce morbidity and mortality.

About 50% of infant deaths occur within the 1st month (neonatal period) of life, of these more than half die during the first 24–48 h after birth. Neonates are prone to develop health problems due to structural and functional immaturity of various body organs. Neonatal death shows the loss of thousands of potential citizens each year. This, apart from being a grievous economic and social loss, is a source of immeasurable grief to thousands of parents. Hence, this is a field full of challenging enigmas to pediatricians [2]. We planned to study the pattern of morbidity and mortality in neonate (0–28 days) admitted to NICU of a tertiary care hospital of Central India.

MATERIALS AND METHODS

This was a retrospective record-based study conducted in the NICU of a tertiary care hospital of Central India between August 2014 and August 2016. Medical records of 500 outborn neonates admitted in NICU were reviewed. The data on outborn admission, sex, gestational age, weight for gestation, indications for admission, duration of hospitalization, complications encountered, investigation done during hospitalization, and outcome were extracted. Referring place was noted as those referred from other hospitals as well as home deliveries. Antenatal history regarding high-risk pregnancy and maternal risk factors was asked. Natal history included place, duration, and mode of delivery. In postnatal history, the following points were noted: First, cry immediately after birth, resuscitation if required, and its modes and medication if any was enquired.

Gestational age was assessed according to the New Ballard scoring and last menstrual period and categorized as preterm, term, and post-term. Birth weight was recorded within at 1 h
of admission and categorized as - appropriate for date, small for date, or large for date with respect to their gestational age. General examination findings were recorded for all the babies with special reference to meconium staining, cyanosis, icterus, hypothermia, icterus, sclerema, dehydration, and any congenital malformation. Similarly, detailed systemic examination findings were also recorded. Final outcome whether discharged, expired, absconding and leave against medical advice (LAMA) and duration of hospital stay were recorded. All the cases divided into four groups - 0–24 h, 1–3 days, 3–7 days, and 7–28 days.

RESULTS

Most of the neonates were males (60.2%), and the male-to-female ratio was 1.51:1. Proportional mortality rate (27.24%) in females was higher than in males (30.15%) (p>0.05). A total of 22.4% neonates were term (>37 weeks) and 77.6% were preterm (<28 weeks and 28–37 weeks). Preterm babies accounted for 48.6% and term babies 51.40% of the neonatal death. Proportional mortality rate was higher (65.17%) in term newborns and was statistically significant (p<0.01). Most of the neonates were referred to hospital within 24 h of birth, and mortality was higher in neonates admitted within 24 h of life (p<0.05). Most of the babies were delivered vaginally (94.2%), whereas 5.8% delivered by lower segment cesarean section, but the difference was not statistically significant (Table 1).

The major causes for morbidity in newborn were neonatal septicemia (32.8%) and prematurity (31.4%) followed by birth asphyxia (15.2%) and neonatal hyperbilirubinemia (9%) (Table 2).

Nearly 40% of the babies had two or more problems at the time of admission. The major causes of death in this study were RDS (46.4%), neonatal sepsis (21.9%), followed by prematurity (15.4%) and hypoxic-ischemic encephalopathy (9.2%) (Table 3).

The outcome of hospitalized neonate showed that 310 (62%) of the newborns were discharged, 142 (28.4%) newborns expired, 45 (9%) newborns LAMA, and 0.6% were referred to other hospitals. In the study, 70% babies were LBW, and proportional mortality was highest (100%) in extremely LBW babies. Proportional mortality was also significantly high (53.01%) in LBW (1–1.5 kg) baby (p<0.05). Of 500 newborns, most of the neonates were referred to hospital within 24 h of birth. Proportional mortality rate was higher in neonate admitted within 24 h of life (p<0.05).

DISCUSSION

Most of neonates who were admitted in our hospital with various complaints during the study period were males (60.2%), and male-to-female ratio was (1.5:1); proportional mortality rate in females was higher than males, but statistically there was no association of mortality with the gender. Contradictory findings were observed by a study done by Okposio and Ighosewe in 2016 [3], where a total of 122 deaths were recorded during the study period, of which 78 were males while 44 were females giving a male: female ratio of 1.7:1. However, there was no significant association between gender and mortality. In another study, Singh and Haider [4] showed mortality higher in males 53.8% as compared to females 46.15%.

In this study, 22.4% were term babies (>37 weeks newborn) and 77.6% were preterm (<28 weeks). Proportional mortality rate was more (65.17%) in term newborns than the preterm babies (25%), and the difference was statistically significant. In a study by Okposio and Ighosewe [3], 18.7% of the neonates were preterm with a mean gestational age of 35.6±3.9 weeks while 3.7% were post-term. A similar study was done by Singh et al. [5], where mortality was more (92.7%) in preterm newborns than the term newborns (49.3%). Sarna et al. [6] observed 100% proportional mortality in <28 weeks gestational, 95.1% in 29–30 weeks newborn, and 61% in 31–32 weeks newborn. In a study by Rather et al. [7], late preterm infants were at significantly higher risk for overall morbidity due to any cause (p<0.0001), respiratory morbidity (p<0.0001), mechanical ventilation (p=0.0002), jaundice (p<0.0001), hypoglycemia (p<0.0001), and sepsis (p<0.0001).

In the study, 70% of babies were LBW and proportional mortality was highest (100%) in extremely LBW babies. Similar results were reported by Singh et al. [8] in very LBW group (<1000 g - 84.6%, 1000–1250 g - 68.7%, and 1251–1500 g - 45.7%). A study conducted by Saminathan et al. showed that of 3582 babies, the incidence of LBW was 44% [9]. Of 500 newborns, most of the neonates were referred to hospital within 24 h of birth. Proportional mortality rate was higher in neonate admitted within 24 h of life (p<0.05). The high mortality rate may be due to the reason that severely sick newborns were referred to this hospital just after delivery. In a study done Okposio and Ighosewe in 2016 [3], most of the neonates were admitted after 24 h of life with a mean age at admission of 5.7±5.9 days.

In this study, neonatal septicemia (32.8%) and prematurity (31.4%) were the two most common reasons for newborn morbidity. In a study by Ekwochi et al. [10], a total of 261 neonates were admitted during the study period and the common causes of admissions seen from the study were perinatal asphyxia (30.7%), LBW (24.5%), neonatal sepsis (16.9%), and neonatal jaundice (0.06%). Singh and Haider [4] showed that birth asphyxia was found in 75% of cases, neurological complication in 51%, pulmonary problem in 36%, and neonatal sepsis in 18%, and the major congenital malformation in 11.19% of the newborns. A study by Bhalia et al. [11] reported that the maximum morbidity was due to neonatal infection (31.4%) and asphyxia (27.4%). In another study, the leading causes of admissions were neonatal sepsis, prematurity, perinatal asphyxia, hemorrhagic disease of the newborn, and neonatal jaundice [3]. RDS (21.9%), sepsis (19%), perinatal asphyxia (16.37%), and jaundice (12.9%) were the chief morbidities as reported by Rakhola et al. in their study [12]. Saminathan et al. studies the morbidity profile of newborns and found that 43% had birth asphyxia, 41% had prematurity and its complications, and 34% admitted with RDS [9].
The major etiological cause of death in this study was found to be RDS (46.4%) followed by NNS (21.9%). In one of the studies conducted by Ekwochi et al. [10], a total of 37 (14.2%) deaths were recorded during the period, and the leading causes of deaths were severe form of perinatal asphyxia (52.9%), neonatal sepsis (29.4%), and very LBW (0.06%). Sarna et al. [6] reported that RDS and prematurity (29.3%), sepsis (24.4%), and asphyxia (16.2%) contribute to neonatal death. In a study conducted by Rakholia et al. [12], the chief causes of mortality among newborns were prematurity (25.6%), sepsis (21.6%), perinatal asphyxia (19.5%), and RDS (17.3%). In this study, the newborn mortality rate was 28.4%, which was slightly higher as compared to a study done by Okposio and Ighosewe in 2016 [3], where they found newborn mortality rate to be 20.3%. Much lower mortality rate was reported by Eke et al. in Nnewi and by Ekwochi et al. [10,13].

In the present study, the outcome of hospitalized neonate showed that 62% of the newborns were discharged, 28.4% newborns expired, 9% newborns LAMA, and 0.6% were referred to other hospitals. In a study done by Rakholia et al. [12], most of the neonates admitted were survived (66.57%), the percentage of the admitted neonates, who went on LAMA, was 8.32%, while referred neonates were 4.58% and 20.53% neonates were died. Saminathan et al., in their study, showed the outcome of babies. Of 3582 babies admitted, 89% (3216) of babies were discharged well and 6.72% (241) babies died in a period of 1 year [9].

Several limitations exist in the present study. First of all, the study was of retrospective nature and the official records were the only method to determine the extent and depth of information related to newborn death, so the exact cause of death was not determined. Second, newborns admitted in general ward and those referred due to non-availability of beds were not studied and could hence modify the results, and finally, maternal details were not studied in the present study.

**CONCLUSION**

In the present study, it was found that neonatal septicemia and prematurity were the leading reason for the newborn morbidity. Therefore, suitable measures should be taken to reduce the preterm delivery. Apart from this, strengthening perinatal care, treatment of genitourinary infection, interval of pregnancy,

| Parameters | Admission n (%) | Mortality n (%) | Proportional mortality rate (%) | p value (Chi-square) |
|------------|----------------|----------------|--------------------------------|---------------------|
| Sex        | Male           | 301 (60.2)     | 82 (57.7)                      | 27.24               | p>0.05 (0.49)      |
|            | Female         | 199 (39.8)     | 60 (42.3)                      | 30.15               |                     |
| Gestational age (weeks) | | | | | |
| <28        | 16 (3.2)       | 4 (2.81)       | 25                             | *p<0.01 (56.37)     |
| 28–32      | 120 (24)       | 18 (12.67)     | 15                             |                     |
| 32–37      | 252 (50.4)     | 47 (33.09)     | 12.65                          |                     |
| >37        | 112 (22.4)     | 73 (51.40)     | 65.17                          |                     |
| Age at admission | | | | | |
| <24 h      | 282 (56.4)     | 97 (68.30)     | 34.39                          | *p<0.05 (16.9)      |
| 24–72 h    | 63 (12.6)      | 7 (4.92)       | 19.44                          |                     |
| 3–7 days   | 67 (13.4)      | 13 (9.15)      | 19.40                          |                     |
| >7 days    | 88 (17.6)      | 25 (17.60)     | 28.40                          |                     |
| Mode of delivery | | | | | |
| Vaginal    | 471 (94.2)     | 139 (97.88)    | 29.51                          | p>0.05 (4.93)       |
| LSCS       | 29 (5.8)       | 3 (2.11)       | 10.34                          |                     |

*P Value - Statistically Significant, LSCS: Lower segment cesarean section

**Table 2: Reasons for morbidity of newborns**

| Causes of morbidity | Number of cases 500 (%) |
|---------------------|-------------------------|
| Neonatal septicemia | 164 (32.8)              |
| Prematurity         | 157 (31.4)              |
| Birth asphyxia      | 76 (15.2)               |
| Neonatal hyperbilirubinemia | 45 (9)                |
| Meconium aspiration | 27 (5.4)                |
| Major congenital malformation | 22 (4.4)              |
| RDS                 | 9 (1.8)                 |
| Total               | 500 (100)               |

**Table 3: Reasons for mortality of newborns**

| Causes of mortality | Number of cases 351 (%) |
|---------------------|-------------------------|
| RDS                 | 60 (46.4)               |
| Neonatal sepsis     | 30 (21.9)               |
| Prematurity         | 22 (15.49)              |
| HIE                 | 13 (9.2)                |
| Extremely LBW       | 6 (4.2)                 |
| Meconium aspiration syndrome | 2 (1.4)           |
| Congenital pneumonia| 1 (0.7)                 |
| Congenital heart disease | 1 (0.7)             |
| Congenital malformation | 1 (0.7)            |
| Total               | 142 (100)               |

RDS: Respiratory distress syndrome, HIE: Hypoxic-ischemic encephalopathy, LBW: Low birth weight
emergency obstetric services, and enhancement of neonatal resuscitation should be kept in mind to enhance the chances of neonatal survival. Neonatal mortality cannot be reduced by slogans alone; it demands pragmatic decision-making and firm action to achieve this goal.

REFERENCES

1. Prasad V, Singh N. Causes of morbidity and mortality in neonates admitted in government medical college, Haldwani, Kumaun region, (Uttarakhand) India. J Pharm Biomed Sci JPBS 2011;8:1-4.
2. Singh M. Care of Newborn. 8th ed. CBS Publisher, New Delhi 2017:4-6.
3. Okposio M, Ighosewe O. Morbidity and mortality pattern among neonates admitted to the general paediatric ward of a secondary health care centre in the Niger delta region of Nigeria. Sri Lanka J Child Health 2016;45:84-9.
4. Singh JP, Haider D. Mortality characteristic of neonate with birth weight above 2000gm. Indian Paediatr 1988;23:179-83.
5. Singh M, Deorari AK, Khajuria RC, Paul VK. A four years study on neonatal morbidity in a New Delhi hospital. Indian J Med Res 1991;94:186-92.
6. Sarna MS, Saili A, Dutta AK, Kumari S. Neonatal mortality Pattern in an urban hospital. Indian Paediatr 1991;28:719-24.
7. Rather G, Jan M, Rafiq W, Gattoo I, Hussain S, Latief M. Morbidity and mortality pattern in late preterm infants at a tertiary care hospital in Jammu and Kashmir, Northern India. J Clin Diagn Res 2015;9:SC01-4.
8. Singh M, Tripathy K, Arya LS. Birthweight gestational age correlates of neonatal mortality. Indian J Pediatr 1982;49:511.
9. Saminathan D, Mythili B, Ramesh E, Zacharias M. Incidence, mortality pattern, and outcome of low birth weight babies admitted in a rural tertiary care center: A retrospective study. Int J Sci Study 2016;4:51-4.
10. Ekwochi U, Ndu IK, Nwokoye IC, Ezenwosu OU, Amadi OF, Osuorah D. Pattern of morbidity and mortality of newborns admitted into the sick and special care baby unit of Enugu State University Teaching Hospital, Enugu state. Niger J Clin Pract 2014;17:346-51.
11. Bhalla JN, Bhalla M, Srivastava JR. Effect of Intrauterine growth on Gestational maturity on morbidity and mortality pattern of babies requiring special care. Indian Paediatr 1979;16:41-7.
12. Rakholia R, Rawat V, Bano M, Singh G. Neonatal morbidity and mortality of sick newborns admitted in a teaching hospital of Uttarakhand. Chrsmed J Health Res 2014;1:228-34.
13. Eke CB, Ezomike UO, Chukwu BF, Chinawa JM, Korie FC, Chukwudi N, et al. Pattern of Neonatal mortality in a tertiary health facility in Umuahia, South East Nigeria. Int J Trop Dis Health 2014;4:136-46.

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