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MORBIDITY AND MORTALITY PROFILE OF PRETERM NEONATES ADMITTED IN A TERTIARY CARE TEACHING HOSPITAL, MANDYA

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ABSTRACT

Background: Preterm neonates are more prone for mortality and acute morbidity. Preterm neonates born in developing nations are at higher risk of mortality. This study was carried out to find the morbidity and mortality profile of preterm neonates admitted to Neonatal Intensive Care Unit (NICU) at tertiary care teaching hospital, Mandya

Materials and methods: A retrospective case record review and analysis of data related to preterm neonates admitted to the NICU during study period of January 2021 to December 2021 was carried and analyzed using appropriate statistical tools

Results: 938 preterm neonates were admitted during study period, majority were male. 52.77 % of neonates were of gestational age 34- 37 weeks, 74.31 % neonates were of weight 1.5- 2.5 Kg. Morbidity causes were sepsis (26.76 %), followed by jaundice (21.96 %) and RDS (17.91 %). Mortality rate of preterm neonates was 6.84 %. RDS was the primary reason for majority of preterm neonate death (65.62 %), followed by sepsis (14.06 %), HIE (10.94 %) and congenital malformations (7.82 %)

Conclusion: Premature birth leads to significant morbidity and mortality. RDS, jaundice, sepsis and HIE were the important causes of morbidity. RDS, sepsis and HIE were the major contributors for mortality. Mortality of preterm neonates was significantly high in neonates of gestational age < 28 weeks and birth weight of < 1 Kg.

Key words: Preterm neonate, mortality, morbidity, RDS, sepsis

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INTRODUCTION

Neonates born prior to 37 weeks of gestational age are considered as Preterm neonates as per World Health Organization. These neonates are more prone for mortality and acute morbidity. Preterm birth and its complications are the leading cause of mortalityamong children < 5 years of age, responsible for approximately 1 million deaths per year.[1,2] It is estimated that nearly 15 million babies are born preterm annually.[3]

With increase in availability, improvement in neonatal care and proper aseptic measures there has been reduction in mortality due to Hypoxic ischemic encephalopathy (HIE), sepsis, meconium aspiration syndrome (MAS). Presently preterm related deaths are leading cause of mortality in neonatal period.

Infants born preterm are four times more likely than term neonates to die during the neonatal period (first 28 days).[4] Mortality rates increase proportionally with decreasing gestational age and birth weight.[5,6] Preterm babies born in developed countries have almost ten times better survival rates compared to those born in low-resource settings.[3]In low income setting half of the babies born at 32 weeks die due to lack of feasible cost- effective care and basic care for infection and breathing difficulties.

Most deaths of preterm neonates in developing nations occur from preventable causes such as infection, asphyxia, hypothermia and hypoglycemia. Many die needlessly for lack of simple, essential care such as warmth and feeding support.[7]Understanding causes and circumstances preceding pretermneonatal death is essential for accelerating progress towards Sustainable Development Goal (SDG) 3 target 3.2that aims at reducing neonatal mortality rates to 12 per 1,000 live births by 2030.

Pattern of admission of neonates to NICU varies in different setup and changes with improvement of care, infrastructure and human resources availability. Data of neonatal mortality of developed countries cannot be generalized due to these reasons. This study was carried out to find the morbidity and mortality profile of preterm neonates admitted to Neonatal Intensive Care Unit (NICU) at tertiary care teaching hospital, Mandya.

MATERIALS AND METHODS

The present study was carried out in the Neonatal Intensive Care Unit (NICU), Department of Paediatrics, Mandya Institute of Medical Sciences, Mandya. Prior to start of study approval from Institutes Ethics Committee was obtained. A retrospective case record review and analysis of data related to preterm neonates admitted to the NICU during study period of January 2021 to December 2021 who satisfied inclusion and exclusion criteria was done. Necessary details from the case record was collected and entered in to pre-designed proforma.

Inclusion Criteria: Neonatal period was defined as the period from birth to first 28 days of life.All neonateswho were born prior to 37 weeks gestational age and admitted to NICU were included

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Exclusion criteria: Neonates whose care records are incomplete due toreferral to other hospital or who Left against Medical advice were excluded from the study

Admitted neonates were categorized based on gender, birth weight and gestational age. Neonates delivered in the institute were categorized as inborn and those delivered outside the institution as outborn. Cause for NICU admission and reason for death in admitted preterm neonates was determined.

STATISTICAL ANALYSIS

Data thus obtained was complied and entered in MS Excel spreadsheet and analyzed using appropriate statistical tools in Open Epi statistical software, version 2.3. Categorical data were expressed as frequency and percentage. Chi- square test was used to compare difference in the groups. A p- value of < 0.05 was considered as significant statistically.

RESULTS

During the study period of January 2021- December 2021 there were 8369 live births, of this 2281 neonates needed NICU hospitalization due to various causes, 85 neonates were referred/ LAMA hence the number was reduced to 2196. Among these 2196 inborn neonates 1487 were of gestational age >37 weeks hence excluded from study, number of inborn preterm neonates included for analysis was **712**. A total of 560 neonates delivered at other hospital were referred to our institution and 53 neonates LAMA/ referred, among these 507 neonates **226** were preterm neonates. Total number of preterm neonates included for final analysis was 938. Higher number of neonates were Male (both inborn and outborn group). (Table 1)

Table 1: Gender distribution of admitted preterm neonates

Gender	Inborn, n= 712 (%)	Outborn, n= 226 (%)	Total, n= 938 (%)
Male	407 (57.16)	127 (56.19)	534 (56.93)
Female	305 (42.84)	99 (43.81)	404 (43.07)

Among 938 neonates, 495 were of gestational age 34- 37 weeks, 416 were of gestational age 28- 34 weeks and 27 neonates were of gestational age < 28 weeks. (Table 2)

Table 2: Distribution of admitted preterm neonates according to gestational age

gestational age	Inborn, n= 712 (%)	Outborn, n= 226 (%)	Total, n= 938 (%)
34- 37 weeks	393 (55.2)	102 (45.13)	495 (52.77)
28- 34 weeks	302 (42.42)	114 (50.44)	416 (44.35)
< 28 weeks	17 (2.38)	10 (4.43)	27 (2.88)

111 neonates were of weight > 2.5 Kg, 697 were of weight 1.5- 2.5 Kg, 103 were of weight 1- 1.5 Kg and 27 were of weight < 1 Kg. (Table 3)

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Table 3: Distribution of admitted preterm neonates according to birth weight

Birth weight (In Kilogram)	Inborn, n= 712 (%)	Outborn, n= 226 (%)	Total, n= 938 (%)
> 2.5	76 (10.68)	35 (15.49)	111 (11.83)
1.5- 2.5	548 (76.97)	149 (65.93)	697 (74.31)
1- 1.5	71 (9.97)	32 (14.15)	103 (10.98)
< 1	17 (2.38)	10 (4.43)	27 (2.88)

Major morbidity among hospitalized preterm neonates was sepsis (n= 251, 26.76 %), followed by Jaundice (n= 206, 21.96 %), respiratory distress syndrome (RDS) (n= 168, 17.91 %) and nutrition & supportive care (n= 127, 13.5 %). 57 (6.08%) neonates were admitted with major congenital malformations (Figure 1).

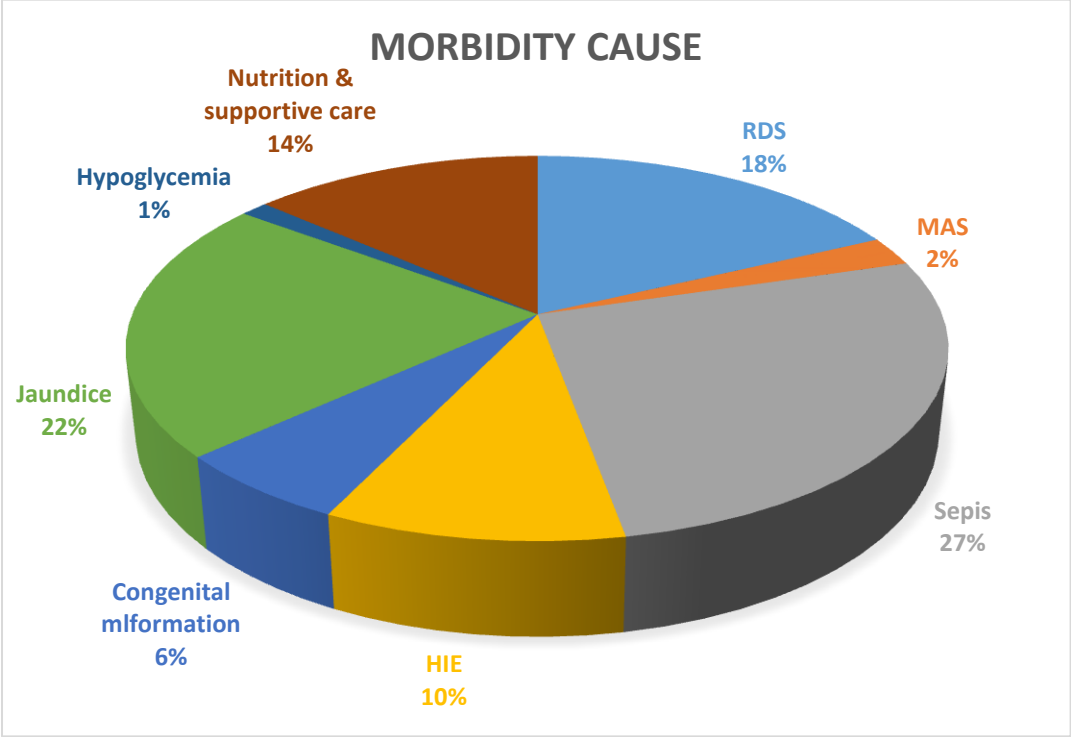

Figure 1: Pie chart depicting morbidity profile of Preterm neonates (n= 938) (MAS- meconium aspiration syndrome, HIE- hypoxic ischemic encephalopathy, RDS- respiratory distress syndrome)

There were 64 deaths registered during the study period. Of the 712 inborn neonates 39 expired (5.48%) and among 226 outborn neonates 25 expires (11.06%). Difference of death observed between inborn and outborn neonates was significant statistically (Chi- square test, p= 0.0006).

Causes for mortality among preterm neonates was RDS (n= 42, 65.62 %), sepsis (n=9, 14.06 %), HIE (n= 7, 10.94 %), congenital malformations (n= 5, 7.82 %) and antenatal intestinal perforation of unknown cause (n= 1, 1.56 %) (Figure 2). Congenital malformations responsible for death were 1 case of diaphragmatic hernia, 1 case of renal malformation with Potter's syndrome, 3 cases of cyanotic congenital heart disease.

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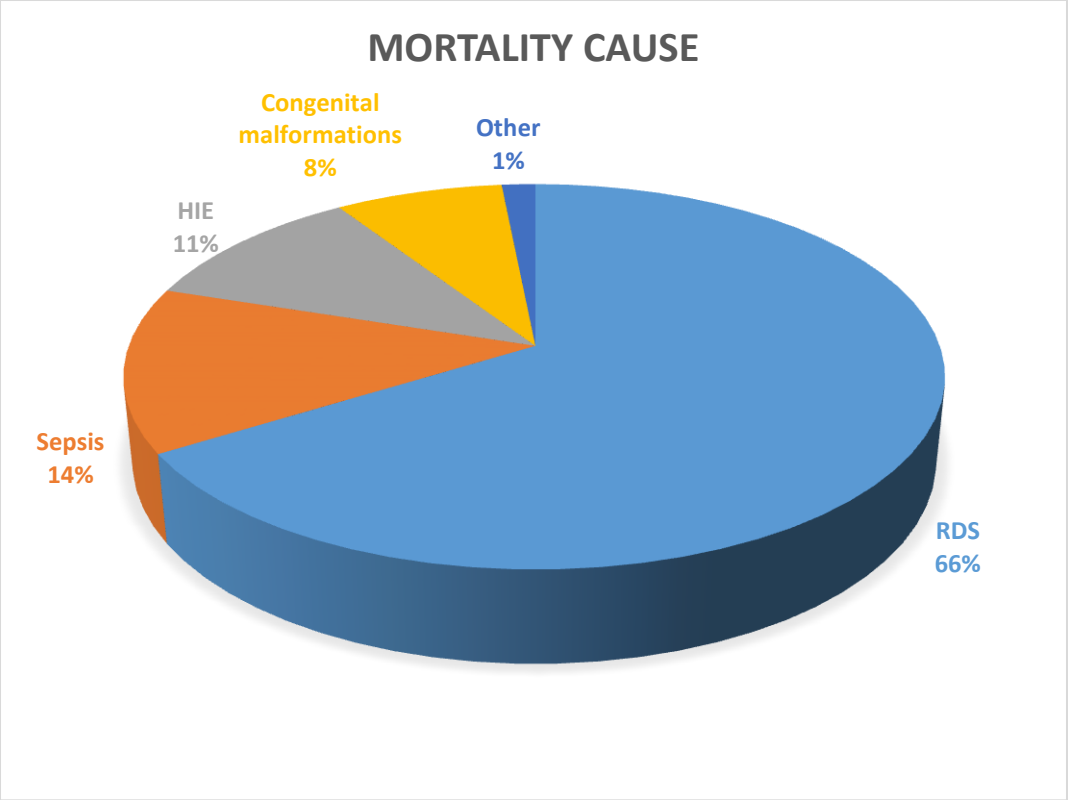

Figure 2: Pie chart depicting mortality profile of Preterm neonates (n= 938) (MAS- meconium aspiration syndrome, HIE- hypoxic ischemic encephalopathy, RDS- respiratory distress syndrome)

Of the 95 neonates with RDS who were given surfactant therapy, 37 (38.95 %) neonates expired. 103 neonates were put on CPAP for respiratory support and 97 neonates were put on mechanical ventilator support, of these 97 neonates on ventilator support 45 (46.39 %) expired.

Among the preterm neonates who expired, 23 (35.94 %) were of gestational age < 28 weeks, 28 (43.75 %) were of gestational age 28- 34 weeks and 13 (20.31 %) were of gestational age 34- 37 weeks. Difference in the frequency of death among various gestational age group was significant statistically (Chi- square test, p = < 0.0001). Only 4 (14.81%) neonates of gestational age < 28 weeks survived as compared to 388 (93.27%) neonates of gestational age 28- 34 weeks and 482 (97.37%) neonates of gestational age 34-37 weeks.

Among the preterm neonates who expired 23 (35.94 %) were of birth weight < 1Kg, 21 (32.81 %) were of birth weight 1- 1.5 Kg, 16 (25 %) were of birth weight 1.5- 2.5 Kg and 4 (6.25 %) were of birth weight > 2.5 Kg. Difference in the frequency of death among various weight group was significant statistically (Chi- square test, p = < 0.0001). Only 4 (14.81%) neonates of birth weight < 1Kg survived as compared to 82 (79.61 %) neonates of birth weight 1- 1.5 kg, 681 (97.70 %) neonates of birth weight 1.5- 2.5 Kg and 107 (96.45 %) neonates of birth weight > 2.5 Kg.

DISCUSSION

With the improvement in health care facility and advancement in neonatal care there has been great reduction in mortality due to HIE, MAS and sepsis. Number of preterm

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deliveries and their survival has increased in the recent years. As a consequence the admission profile of neonates to NICU has undergone a higher change. Neonatal mortality due to the improved availability of NICU facilities has gradually reduced over the years, however it has reached a level from which the reduction has slowed.

The present study highlights the morbidity and mortality profile of preterm neonates admitted to NICU of our institute which is located in Mandya, Karnataka. During the study period there were 8369 live births at the institution. 938 neonates hospitalized were born prematurely (Inborn- 712, Outborn- 226). 56.93 % of neonates among these were Male. Similar male predominant admission profile has been reported by Shreshta et al.[8] 52.77 % of neonates were of gestational age 34- 37 weeks, 44.35 % neonates were of gestational age 28- 34 weeks and 2.88 % of neonates were of gestational age < 28 weeks. 74.31 % neonates were of weight 1.5- 2.5 Kg, 11.83 % neonates were of weight > 2.5 Kg, 10.98 %neonates were of weight 1- 1.5 Kg and 2.88 % of neonates were of weight < 1 Kg. Similar gestational age and birth weight distribution has been reported in prior studies.[9,10`]

Most common reason for hospitalization was sepsis (26.76 %), followed by jaundice (21.96 %) and RDS (17.91 %). 6.08 % preterm neonates were admitted with major congenital malformations. Morbidity profile reported in our study is similar to those observed in previous studies.[8,9,11] 10.95 % of preterm neonates hospitalized were given surfactant therapy. 21.37 % of neonates needed respiratory support in the form of CPAP and mechanical ventilator. In study by Baki MA et al., 37.5 % of neonates had need for respiratory support (CPAP, mechanical ventilation.[12]

Mortality rate of preterm neonates in our study was 6.84 %, mortality rate of Inborn neonates was 5.48 % and that of outborn neonates was 11.06 %. The difference was significant statistically. The higher death among outborn neonates may be probably due to higher number of sick neonates been received and delay in start of appropriate therapy (due to time lost during transport of neonates). Mortality of preterm neonates in the study is significantly lower than that reported by Shrestha et al., and Khan MR et al., [8,13]

RDS constituted major chunk of preterm neonate death (65.62 %), followed by sepsis (14.06 %), HIE (10.94 %) and congenital malformations (7.82 %).

Causes for mortality among preterm neonates was RDS (n= 42, 65.62 %), sepsis (n=9, 14.06 %), HIE (n= 7, 10.94 %), congenital malformations (n= 5, 7.82 %) and antenatal intestinal perforation of unknown cause (n= 1, 1.56 %). Only 14.81 % of neonates with < 28 weeks of gestational age survived as compared to neonates of gestational age 28- 34 weeks (93.27 %) and 34- 37 weeks (97.37 %). The difference in the mortality frequency in various gestational age groups was significant statistically. This observation highlights the need to provide additional facility for care of extreme preterm neonates.

CONCLUSION

Premature birth leads to significant morbidity and mortality, constituting to higher chunk of under 5 mortality in children. RDS, jaundice, sepsis and HIE were the important causes of morbidity in our study. RDS, sepsis and HIE were the major

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contributors for mortality in our study. Mortality of preterm neonates was significantly high in neonates of gestational age < 28 weeks and birth weight of < 1 Kg.

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