Mortality and Morbidity Pattern in Neonatal and Paediatric Population: A Hospital Based Retrospective Observational Study

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ABSTRACT

Child mortality is a sensitive indicator of a country's development. In up to half of under-five deaths an underlying cause is undernutrition, which deprives a young child's body and mind of the nutrients needed for growth and development. **Aims and Objectives:** The aim of this study is to evaluate the morbidity and mortality pattern of neonates and children admitted into paediatric department of a tertiary care centre. **Methodology:** In a retrospective observational study, patients of aged one day to 12 years, admitted into the neonatal intensive care unit and paediatric wards and paediatric ICU over a 1-year period were included. **Results:** Total 1213 neonates were admitted, out of which 649 (53.50%) were males and 564 (46.50%) were females. Total number of neonatal deaths was 252 (20.75%). Among neonates, almost half of the deaths (48%) were seen due to respiratory distress syndrome followed by 25% due to birth asphyxia and 7% due to sepsis. Among fewer than 5 children, most common cause of death was found to be bronchopneumonia seen in 17.3% patients followed by congenital heart disease in 14.6% patients. Among children with 5years to 12 Years of Age, most common cause of death was snake bite seen in 26% patients followed by Status Epilepticus in 21.7% patients. **Conclusions:** Maximum numbers of neonatal deaths were because of respiratory distress syndrome and birth asphyxia which are preventable causes and mortality in under five is mainly due to bronchopneumonia and congenital heart disease.

Keywords: Infants, Neonates, Neonatal Mortality, Under five Mortality

INTRODUCTION

An ongoing reliable and comparative analysis of causes of death in different age groups, particularly in neonates and young children is the basis for national and international decision-making and planning process in the health system.(1,2) Child mortality is a sensitive indicator of a country's development and telling evidence of its priorities and values (3). Every day, more than 26,000 children under the age of five die around the world, many of them die due to preventable causes. Most of them live in developing countries (4).

In up to half of under-five deaths an underlying cause is undernutrition, which deprives a young child's body and mind of the nutrients needed for growth and development. Unsafe drinking water, poor sanitation and inadequate hygiene also contribute immensely to child mortality and morbidity (5). India has a highly significant role to play in global efforts to end the preventable death of newborns and children under the age of five, given that it has the highest number of deaths among these two groups in the world. According to various rounds of the National Family Health Survey (NFHS) data, the under-five mortality

rate (U5MR) has declined by a little more than half in the past 23 years, namely, from 109 deaths (per 1000 live births) in 1990 to 50 deaths (per 1000 live births) in 2013 (6). The reduction in the neonatal mortality rate (NMR) was only 19 (per 1000 live births) (from 49 deaths per 1,000 live births, 1990 to 30 deaths per 1,000 live births, 2013)

Thus, if India experiences a similar decline in the U5MR and the NMR in the next 12 years, it is very likely to meet the target set by the Sustainable Developmental Goals (SDGs) for U5MR but unlikely to meet the NMR target. As per Target 3.2 of SDG3 indicates that by 2030, seeks to end preventable deaths of newborns and children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1,000 live births and under-5 mortality to at least to as low as 25 per 1,000 live births.(6,7)

AIMS AND OBJECTIVES

The aim of this study is to evaluate the morbidity and mortality pattern of neonates and children admitted into the neonatal intensive care unit and paediatric medical wards respectively of a tertiary care centre, Government Medical College, Miraj from January 2018 to December 2018.

REASON FOR THE STUDY

Hospital based data on mortality pattern is a reflection of what is obtainable in a community at large. Therefore, data obtained from such a review is usually beneficial in re-evaluating existing services and in improving facilities and patient care.

METHODOLOGY:

This is a retrospective observational study. The case files of all patients aged one day to 12years, admitted into the neonatal intensive care unit and paediatric wards and paediatric ICU of Government Medical College, Miraj over a 1-year period were reviewed. Surgical and burns cases were excluded as we have separate facility for managing these patients.

The principal diagnosis was based on the final assessment by the managing unit. It was based on the presenting clinical features, with or without the results of laboratory tests.

The cause of death as documented after weekly mortality reviews was considered as the final cause of death. And the primary cause of death was

considered for data collection.The data collected was analysed by tabulating it.

INCLUSION CRITERIA:

1. All neonates admitted to NICU from January 2018 to December 2018
2. All patients admitted to ward and PICU from January 2018 to December 2018

EXCLUSION CRITERIA:

All surgical cases, trauma and burns patients were excluded

RESULTS:

A. NEONATAL ADMISSIONS:

Total 1213 neonates were admitted over one-year period, out of which 649 (53.50%) were males and 564 (46.50%) were females.

1. Age-wise distribution of neonates based on the age at admission:

Out of total 1213 neonates, majority of the neonates [509 (41.9%)] were early neonates, from age group <7 days, 335 (27.6%) were from age 7-14 days and 369 (30.5%) were from age group > 14 days.

2. Weight-wise distribution of neonates:

Out of total 1213 neonates, majority of the neonates [434(35.8%)] were weighing between 1.5 to 2.5 kg followed by 408 (33.7%) from weight group >2.5 kg, and 30.5% neonates were weighing <1.5 kg.

3. Diagnosis of Neonates:

Majority of the neonates [348 (28.7%)] were admitted for low birth weight (LBW) with intra-uterine growth retardation (IUGR) followed by 161 (13.8%) LBW with preterm gestation followed by hyperbilirubinemia in 156 (12.9%). 118 (9.7%) neonates were having Birth Asphyxia with HIE. Less common diagnosis were Respiratory Distress Syndrome, Sepsis, Meconium aspiration syndrome and other conditions like TTN, CHD, NEC etc. seen in 52 (4.3%), 46 (3.8%), 09 (0.7%) and 323 (26.1%) neonates respectively.

4. Neonatal Mortality:

Total number of neonatal deaths was 252 i.e. 20.75% of all admissions over a period of one year.

4. A: Age and Mortality:

Among neonates, majority of the deaths (86.10%) were seen in early neonates (< 7 days) followed by 8.70% mortality in neonates aged between 7-14 days. Least mortality (5.20%) was seen in >14 days old neonates.

4. B: Body weight and Mortality:

Majority of the deaths (48.40%) were seen in neonates weighing between 1.5kg to 2.5kg followed by 21.80% mortality in neonates weighing >2.5 kg,

followed by 16.70% mortality in neonates weighing between 1-1.5 kg. Least deaths were seen in neonates weighing <1kg.

4. C: Cause of Neonatal death:

Among neonates, almost half of the deaths (48%) were seen due to respiratory distress syndrome followed by 25% due to birth asphyxia and 7% due to sepsis. (Fig.1)

Figure 1: Causes of Neonatal Deaths:
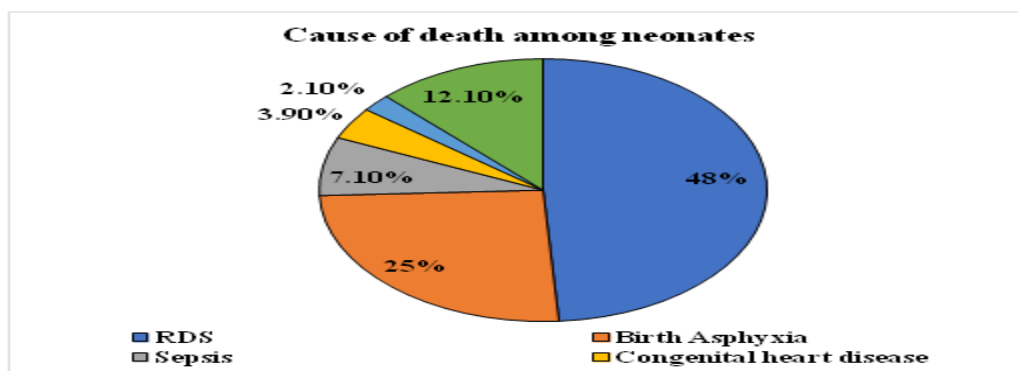
B. PAEDIATRIC ADMISSIONS (1month to 12 years of age):

1614 infants and children were admitted over the one-year study period.

1. Age-wise distribution paediatric patients:

Out of total 1614 infants and children, almost half i.e. 950 (51.4%) were from age group 5 to 12 years followed by 368 (22.4%) from age group 6months to <2years and 275 (16.7%) were from age group 1month to 6months. Only 157 (9.5%) were from age group 2 years to 5 years.

2. Diagnosis wise distribution paediatric patients:

Below bar diagram shows that most of the infants and children were admitted with history of Dog bite (40%) followed by Thalassemia (16%), Bronchopneumonia (9%), acute gastroenteritis (7.7%), bronchiolitis (3.5%).

Figure 2: Diagnosis of infants and children:
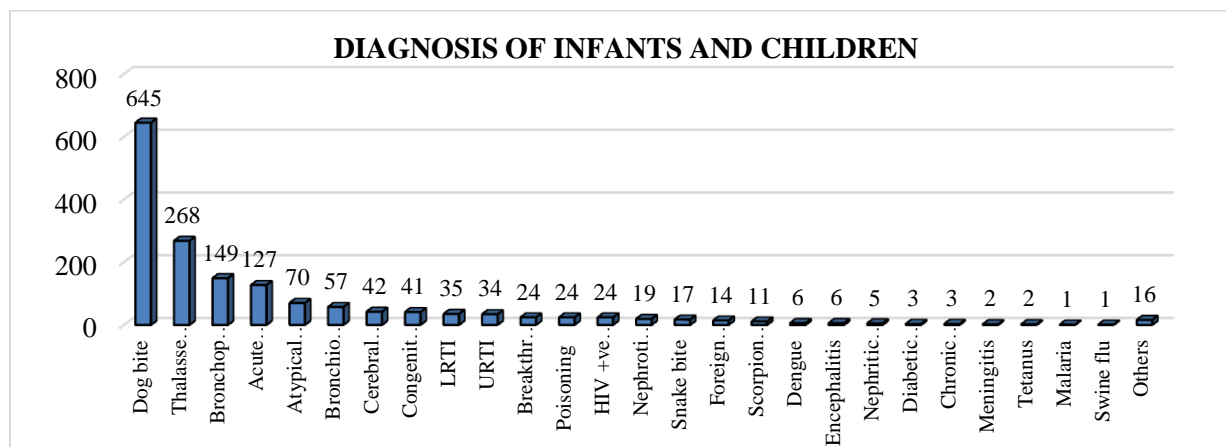
C. PAEDIATRIC DEATHS (1month to 12 years of age):

Among under 5 children, most common cause of death was found to be bronchopneumonia seen in 17.3% patients who died followed by congenital heart disease in 14.6% patients followed by septic shock in 10.6% patients. (Table no. 1)

Among children with 5years to 12 Years of Age, most common cause of death was found to be snake bite seen in 26% patients followed by Status Epilepticus in 21.7% patients and 17.4% died because of Poisoning. (Table no. 2)

Mortality Percentages:

Neonatal mortality (inborn + out born) was 20.75% followed by infant mortality of 10.84%, under 5 child mortality was 11.44% and. 5-12 years child mortality was 6.19%. The overall mortality (deaths from day1-12years of age) was 12.23%

Total inborn admissions were 763 (62.9%) and out born admissions were 450 (37.1%). Total inborn neonatal deaths were 129 (51.19%) of total neonatal deaths and out born neonatal deaths were 123 (48.81%).

DISCUSSION:

Out of 1213 neonates admitted maximum neonates (509 i.e. 41.96%) admitted were less than 7 days old and were low birth weight admitted for low birth weight care (348 i.e. 28.69%). Out of total of 252 deaths maximum neonatal deaths (121 i.e. 48.01%) were found to be due to respiratory distress syndrome and second most common cause was birth asphyxia (63 i.e. 25%). Higher mortality rates due to RDS prompts us to take necessary measures to prevent premature deliveries, early recognition of RDS by clinical judgement & x ray & timely use of surfactant & CPAP.

Also, it was observed that in neonates < 7 days old 42.6% died (217deaths/509admissions). Whereas, neonates having admission age between 7 to 14 days 6.6% died (22/335) and neonates having admission age >14days only 2.1% died (8/369). Thus, was observed that maximum mortality was seen in neonates having admission age of <7 days, which supports our 2 most common causes death namely respiratory distress syndrome and birth asphyxia.

Also, it was observed that 50% neonates having weight <1kg died (33/66), followed by 28.1% mortality (122/434) in 1.5 to 2.5kg weight category.

Higher incidence of birth asphyxia 25% indicates inadequate obstetric care or delay in referral and quality of transport of asphyxiated babies. Acceptable proportion of deaths due to sepsis 7.1% indicates reasonable clean practices in the area. Total deaths in paediatric population in the hospital were 350. Out of these 252 were neonatal deaths which thus comprise 72% of total deaths. The seasonal variation in mortality had been described all over the world [8]. Out of total 1646 children admitted to pediatric ward and PICU, maximum 645 were admitted for dog bite and 268 thalassemia patients were admitted for routine blood transfusion.

Maximum admissions were seen in the age group of 5-12 years. This pattern was probably seen because maximum patients admitted were of dog bite and thalassemia in this age group. We observed that most of the deaths occurred between the months of January and March. This period coincides with dry winter season and early spring (9). Increased mortality during this season may be explained by our finding that the major causes of deaths such as bronchopneumonia occur more frequently during the winter season. Viral infections remain the main cause for bronchopneumonia in under 5 years children.

Proportion of admissions due to non-infectious causes (67.86%) is more than infectious causes even though overall proportion of infectious diseases (32.14%) is more than non-infectious diseases in children in our country. Mortality due to infectious diseases (26.1%) is less in the age group 5 to 12 as compared to under 5 mortality (33.33 %) as expected and as observed in other studies. In a similar study conducted at tertiary care hospital in Latur, a total of 3910 children were admitted to the Pediatric Department during the one-year study period. Total 176 pediatric deaths were observed. Out of total 176 pediatric deaths, 57.95 % were Neonatal deaths. Among the 139 infant deaths, neonatal deaths were 74%. Birth Asphyxia was most common cause for neonatal deaths while septicemia was the leading killer in post neonatal infants (9).

In our study a total of 2859 children were admitted during a period of one year. Total pediatric deaths were 350. Out of 350 pediatric deaths 252(72%) were

neonatal deaths. Among 310 infant deaths, neonatal deaths were 81.29%. Respiratory distress syndrome was most common cause followed by birth asphyxia in neonates whereas in post neonatal infant's bronchopneumonia was the most common cause for death.

We found no similar studies related to morbidity & mortality data from tertiary center in private sector of India.

LIMITATION OF THE STUDY:

During the analysis of records, we observed that the data were incomplete or some entries were inadequate, which were excluded from our study.

CONCLUSIONS AND RECOMMENDATIONS:

More number of admissions in paediatric age group are of dog bite and thalassemia at our hospital as at government hospitals provide exclusive services at affordable rates.

1. As expected, mortality in under five is mainly due to bronchopneumonia and congenital heart disease (CHD). Few of deaths due CHD could be prevented by early detection, referral and intervention. Deaths due diarrhoea in this age group are observed to be decreasing probably due to increased awareness about hygiene & prompt identification & treatment of dehydration. Also, by increasing the awareness of pneumococcal vaccine and flu vaccine we could decrease bronchopneumonia to some extent.
2. As anticipated, infective problem in 5 to 12 years age group are negligible and snake bite followed by status epilepticus caused maximum deaths.
3. Maximum neonatal admissions were low birth weight with intrauterine growth retardation followed by preterm with low birth weight. This indicates more efforts should be taken to prevent premature deaths and to improve growth monitoring and timely intervention in IUGR foetuses.
4. Maximum numbers of neonatal deaths were because of respiratory distress syndrome and birth asphyxia which are preventable causes to some extent. Strategies should be developed to provide better facilities to patients with RDS and to decrease the incidence of birth asphyxia by devising obstetric strategies to improve maternal care and improve neonatal transport facilities.
5. Low incidence of sepsis reflects reasonable neonatal care in the area.
6. Yearly statistical analysis of clinical data of paediatric morbidity and mortality in government hospitals reflects overall epidemiology in the surrounding area.
7. Yearly retrospective analytical study if done at institutional level and critically reviewed to know the factors responsible for changes in morbidity and mortality patterns can help policy makers to take necessary decisions to reduce mortality rates and improve patient care for frequently occurring diseases.
8. Similar collaborative studies at all major institutes in the state and desirably at national level can help understanding the epidemiology in better way, factors responsible for changing epidemiology and help in structuring national programmes, financial planning.

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Table 1: Causes of death among under 5years of Age:

CAUSES	No. of deaths	Percentage
Bronchopneumonia	**13**	**17.3%**
Congenital heart disease	11	14.6%
Septic shock	8	10.6%
Status epilepticus	7	9.3%
Encephalopathy	4	5.3%
Meningo-encephalitis	4	5.3%
Snake bite	2	2.6%
Others (poisoning, malignancies, DIC, CKD, AKI etc)	26	35%
TOTAL	75	100%

Table 2: Causes of death among 5years to 12 Years of Age:

CAUSES	No. of deaths	Percentage
Snake bite	6	26.1%
Status Epilepticus	5	21.7%
Poisoning	4	17.4%
Sepsis	2	8.6%
Meningo-encephalitis	2	8.6%
Others (pneumonia, malignancies, encephalopathy)	4	17.6%
TOTAL	23	100%