Trend and Pattern of Childhood Mortality in a Rural Tertiary Care Hospital of Darjeeling District, West Bengal, using International Classification of Diseases 10\textsuperscript{th} Revision

Maumami Saha\textsuperscript{1}, Sucharita Maji\textsuperscript{2}

ABSTRACT

\textbf{Background:} Trend and pattern of childhood mortality reflect the occurrence and fatality of locally endemic diseases. Knowledge about it helps to make appropriate strategies for prevention and management of those diseases. The objective of the study was to find out the trend, pattern, and causes of childhood mortality in a rural tertiary care hospital.

\textbf{Materials and Methods:} A descriptive retrospective hospital-based study was conducted in Medical Records Department (MRD) of North Bengal Medical College and Hospital in Darjeeling district of West Bengal, India, from May 2016 to October 2017. All childhood (<10 years) deaths during the reference period were recorded and underlying causes of death were classified according to the ICD-10\textsuperscript{th} revision. \textbf{Results:} A total of 5394 children died in this hospital during the reference period. Proportion of male death was higher than female death in every year. Mortality was maximum in early neonatal age group (40.79%) followed by still birth (29.5%). Two peaks were observed in month-wise mortality trend. Maximum was in November followed by January. Around half of the recorded death in perinatal period was due to P50–P96 (hemorrhagic and hematological, digestive system disorder of newborn, and other conditions originating in perinatal period). Birth asphyxia (24.8%) and bacterial sepsis (45.2%) were the leading causes of death in early and late neonatal period, respectively. Certain infectious and parasitic diseases (A00-B99) were the predominant cause of death in rest of the age groups. \textbf{Conclusion:} The pattern of mortality in early, late, and post-neonatal age groups suggests a need for more comprehensive improvement in antenatal, intranatal, and newborn care. Infection control in different levels will help to reduce mortality among older children.

\textbf{Key words:} Trend and pattern, Childhood mortality, Tertiary care hospital, ICD-10

INTRODUCTION

Childhood mortality is one of the important indicators which reflect the country’s development and level of health-care standards. Each year about 27 million children are born in India. Around 10% of them do not survive to 5 years of age. Nearly half of the under-five deaths occur in neonatal period. In the developing countries, death in the 2nd year of life commonly accounts for 50% of all deaths between 1 and 4 years of age.\textsuperscript{[1]} The burden of diseases and survival of children varies in different geographical areas and institutions.\textsuperscript{[2,3]} The pattern and trend of diseases also vary with year and season. Analysis of these records is important for local policy-making, utilization of available resources, and quality improvement of services. During annual planning process in districts and states, it is essential to prioritize child health strategies according to local morbidity and mortality patterns. North Bengal Medical College is located in northern part of West Bengal and it provides tertiary care to populations of almost six neighboring districts. In case of institutional record-based study, mortality study is superior to morbidity.

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study as almost all serious cases are finally referred to tertiary care center. This kind of elaborate childhood mortality study was not done in this institution beforehand.

With this background, the present institutional record-based study was carried out to find out the trend, pattern, and cause of childhood mortality according to ICD-10 at a rural tertiary care center in Darjeeling district of West Bengal.

MATERIALS AND METHODS

It was a retrospective hospital record-based descriptive study, conducted in Medical Records Department of North Bengal Medical College and Hospital, Darjeeling, West Bengal, from May 2016 to October 2017. The hospital has bed strength of 862 and caters a large population of 15 million in the six neighboring districts of northern part of West Bengal. Complete enumeration of children death (including medicolegal cases) that occurred in the hospital during the reference period (5 years period from January 2011 to December 2015) was reviewed. The study was approved by the Institutional Ethics Committee of NBMC. Anonymity and confidentiality were maintained throughout the study. Pre-designed and pre-tested schedule was used to collect data from death registers of MRD.

The underlying causes of death were coded according to ICD-10. Study variables/parameters were – causes of death; age; gender; ward of admission; residential address; date of death; time of death; and distribution of death over time.

Data Analysis

The recorded data were entered into Microsoft Excel data sheet. Data were organized and presented using the principles of descriptive statistics.

RESULTS

Proportional Mortality

| Male:female ratio | 1.43:1 1.57:1 1.39:1 1.64:1 1.56:1 1.52:1 |

Table 1 shows that during study period, total number of recorded child death below 10 years of age was 5394. The study population was classified into six age groups for analysis. Proportion of male mortality was more than female mortality in all age groups. During the reference period, child mortality was maximum (1220) in the year 2014. Proportion of male death was significantly higher than female death in every year (ranging from 1.39 to 1.64, average 1.52).

Figure 1 shows that there were two peaks in month-wise mortality trend. Maximum child mortality was observed in November followed by January. Minimum mortality was in the month of February. Child mortality was gradually increasing from month of February. Similar observation was found in almost each 5 years of the study period.

Table 2 shows that nearly half of institutional early neonatal death was due to birth asphyxia and disorder related to short gestation and low birth weight (LBW). Bacterial sepsis was responsible for about half of late neonatal death. Certain infectious and parasitic diseases were leading cause of death of children aged 1 months to <10 years.

DISCUSSION

In this study, child deaths were recorded by month of registration and child mortality was tabulated in six “age groups” for analysis and it was found that the proportion of male child mortality (59.2%) was higher than female child mortality (40.2%) in all six groups. It may either be due to biological fragility of male children in early age or lower hospital admission of female children due to negligence. Similar result was found in the study done by Patil and Godale at Latur which recorded 61.15% of male and 38.84% of female pediatric death[4] and in a study done by Celine TM at a tertiary care level in Ernakulam district (male child death – 62.0% and female child death – 37.9%).[5] In the present study, child mortality was (40.79%) in early neonatal age group followed by 29.5% still birth and 9.84% death was recorded in 29 days–1 year age group. However, the study done by Tiwari and Ali in a tertiary care center at Garhwal,

| Table 1: Year-wise distribution of recorded child mortality according to gender (n=5394) |
| --- | --- | --- | --- | --- | --- |
| Gender | 2011 | 2012 | 2013 | 2014 | 2015 | Total |
| Male | 565 (58.4%) | 624 (58.9%) | 596 (58%) | 756 (62%) | 698 (60.4%) | 3239 (60.1%) |
| Female | 395 (40.8%) | 397 (38.7%) | 428 (41.7%) | 462 (37.9%) | 448 (39.5%) | 2130 (39.5%) |
| Not recorded | 07 | 04 | 03 | 02 | 09 | 25 |
| Total | 967 (100%) | 1025 (100%) | 1027 (100%) | 1220 (100%) | 1155 (100%) | 5394 (100%) |

Figure 1: Line diagram showing month-wise trend of child mortality (n = 5394)
The pattern of mortality in early, late, and post-neonatal period were birth asphyxia (47.06%) and prematurity with LBW (26.47%). Another study done by Patil at Latur showed that birth asphyxia was the most common cause for neonatal death and septicemia was leading killer of post-neonatal infant which was similar to the finding of the present study.[8]

In the present study, “Certain infectious and parasitic diseases” was leading cause of death during the post-neonatal period. Similar finding was recorded in a study done at Kolkata.[7] Certain infectious and parasitic diseases were also the leading cause of death in 1–9 years of age group in the present study. It may be due to low income, poor nutrition, overcrowding, and poor personal hygiene. However, in a study done at Kolkata, meningocerehalitis was the leading cause of death in 1–11 years age group[7] and a study done by Shah et al.[9] showed that the main cause of mortality during post-neonatal period and 1–5 years age group was diarrhea (39.13%).

In the present study, death due to hemorrhagic and hematological, digestive system disorder of newborn, and other conditions originating in perinatal period (P50–P96) was more for male (18.2%) than female (13.6%) in death due to infection of perinatal period (P35–P39). The disparity between male and female mortality may be due to biological vulnerability of males to infections or discrimination against females. However, it was found that male (6.5%) and female (6.8%) perinatal mortality due to all causes were similar against females. However, it was found that male (6.5%) and female (6.8%) perinatal mortality due to all causes were similar according to MCCD report.

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CONCLUSION

Leading causes of death in early neonatal period were birth asphyxia (24.8%), in late neonatal period were bacterial sepsis of newborn (45.2%), and in post-neonatal and childhood period were certain infection and parasitic diseases. The pattern of mortality in early, late, and post-neonatal

Table 2: Age group wise distribution of the study population according to leading causes of death

<table>
<thead>
<tr>
<th>Age group</th>
<th>Leading cause of death (ICD-10)</th>
<th>Number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early neonate (n=2200)</td>
<td>Birth asphyxia (P21)</td>
<td>546 (24.8)</td>
</tr>
<tr>
<td></td>
<td>Disorder related to short gestation and low birth weight (P07)</td>
<td>504 (22.9)</td>
</tr>
<tr>
<td>Late neonate (n=376)</td>
<td>Bacterial sepsis of new born (P36)</td>
<td>170 (45.2)</td>
</tr>
<tr>
<td></td>
<td>Disorder related to short gestation and LBW (P07)</td>
<td>62 (16.4)</td>
</tr>
<tr>
<td>29 days–&lt;12 months (n=531)</td>
<td>Certain infectious and parasitic diseases (A00 – B99)</td>
<td>113 (21.2)</td>
</tr>
<tr>
<td></td>
<td>Symptoms, signs, and abnormal clinical and laboratory findings (R00–R99)</td>
<td>56 (10.5)</td>
</tr>
<tr>
<td>12 months–&lt;59 months (n=357)</td>
<td>Certain infectious and parasitic diseases (A00 – B99)</td>
<td>104 (29.1)</td>
</tr>
<tr>
<td></td>
<td>Injury, poisoning (S00 – T98)</td>
<td>33 (9.24)</td>
</tr>
<tr>
<td>5 years–&lt;10 years (n=339)</td>
<td>Certain infectious and parasitic diseases (A00–B99)</td>
<td>109 (32.1)</td>
</tr>
<tr>
<td></td>
<td>Injury, poisoning (S00–T98)</td>
<td>23 (6.7)</td>
</tr>
</tbody>
</table>

Uttarakhand, showed maximum death (46.57%) occurred in 29 days–1 year age group.[5]

In the present study, maximum child mortality was observed in the month of November followed by January in every year of the study period. Trend of child mortality was gradually increasing from month of February in every year. The study done by Tiwari and Ali in a tertiary care center at Garhwal, Uttarakhand, shows maximum mortality in the month of June (13.24%) followed by May (10.5%), August (10.04%), and January (9.13%). Lowest mortality was seen in the month of March (4.10%).[5]

In the present study, around half of the recorded death in perinatal period was due to hemorrhagic and hematological, digestive system disorder of newborn, and other conditions originating in perinatal period (P50–P96). According to report on Medical Certification of Cause of Death (MCCD) 2015 death due to hemolytic diseases of fetus and newborn, other disorders originating in perinatal period (P55–P96) were 20.9% in perinatal period.[6]

In the present study, death due respiratory and cardiovascular disorder specified to perinatal period (P20–P29) was 24.6% in 2015, but different picture was found in MCCD report 2015 where death due to hypoxia, birth asphyxia (P20 and P21) was 40.6%. The different picture may be due to variation in nutritional status of mother during antenatal period, quantity and quality of antenatal and intranatal care, in utero transfer of antibody from mother, and variation of treatment of sick children in different institutions.

In the present study, major leading cause of death in early neonatal period was birth asphyxia (24.8%) and in late neonatal period was due to bacterial sepsis of newborn (45.2%). Skilled care at birth with quality improvement is necessary to reduce neonatal death. A study done in Kolkata revealed that birth asphyxia (42.93%) and septicemia (37.56%) were the two most common causes of death in neonatal period.[6] This finding corroborates with the finding of the present study. A study done by Shah et al. shows that major causes of death during neonatal period were birth asphyxia (47.06%) and prematurity with LBW (26.47%). Another study done by Patil at Latur showed that birth asphyxia was the most common cause for neonatal death and septicemia was leading killer of post-neonatal infant which was similar to the finding of the present study.[8]
age groups suggests a need for more comprehensive improvement in antenatal, intranatal, and newborn care. Health awareness programs regarding child care should be conducted frequently among the caregivers. Infection control should be done in multidimensional ways. Emphasis should be given on primary prevention by overall health promotion and specific protection. Universal immunization should be done meticulously. Early care seeking will lead to early diagnosis and prompt treatment of the morbidities. It will help to reduce child mortality to a great extent.

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REFERENCES