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Original Research Article

Facility based retrospective infant death study in a tertiary care hospital of Tripura

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ABSTRACT

Background: Infant and neonatal mortality are important indicators of the overall physical health of a community. An increase is generally indicative of unmet human needs in healthcare, sanitation, nutrition and education. Objective: To estimate the different causes of death along with the geographic distribution of the reported death cases during the study period.
Methods: Analysis of the retrospective mortality data of infant and neonates in the Pediatric Department of Agartala Government Medical College and Hospital, from 2014-2018, was conducted.
Results: A total of 1525 infant deaths were recorded in the study facility, of which 878 (57.57%) were early-neonates, 120 (7.87%) late neonates and 527 (34.56%) post-neonatal infants. The most reported causes of neonatal mortality in Tripura were found to be preterm/low birth weight and perinatal asphyxia with OR of 1.45 (CI=1.137-1.857) and 1.41 (CI=1.10-1.81) respectively.
Conclusions: The increasing burden of preterm births and neonatal sepsis needs attention towards ante-natal care along with holistic healthcare services. The need for intensive actions from both administration and healthcare facility to promote identification of red-flags at primary level, followed by proper referral from the periphery to tertiary care facility has been reiterated in this study.

Keywords: Infant, Neonatal mortality, Tripura

INTRODUCTION

Health is a basic right and Neonatal and Infant mortality (IM) are important indicators of the health and health inequalities within a population.[1] The first 28 days of life termed as the 'neonatal period' carry the highest risk of fatality in comparison to other periods. Neonates are at a 30 fold higher daily risk of succumbing than their post-neonatal counterparts.[2] Although some parts of urban India have achieved a substantial reduction in infant mortality, the stake is still very high in the rural areas.[3] Most third world nations rely primarily on urban power bases and for this reason most public policy initiatives are unable to ensure fortification of health and resources in agro-based states effectively.[4] The Indian infant mortality rate in 2017 (33 infant deaths per thousand live births) was found to be one-fourth as compared to 1971 (129 infant deaths per thousand live births).[5] There has been a national level decline from 53 to 33 in last decade. However corresponding decline in rural area is 58 to 37 and for urban areas it is from 36 to 23.[5] In order to bridge the gap, it is essential to study the trend and variables of

health determinants in every state. As per SRS data pertaining to the year 2017, Tripura (29) has exceeded states like Tamil Nadu (16) and Delhi (16) in matters of infant death rate. Efforts have been made on national level to reduce infant mortality. The implementation of the National Rural Health Mission in 2005 with an aim to augment maternal and child health services and reduce mortality at birth, strategically focused in rural states and the northeast region has helped to mitigate disparities and contributed to the rise in survival rates.

This study was aimed at analysing the retrospective mortality data of infant and neonate in the Paediatric Department of Agartala Government Medical College and Hospital from 2014-2018, in order to estimate the different causes of death along with the geographic distribution of the reported death cases.

METHODS

Study design

The present study was a retrospective data analysis of the demographic and etiological distribution of age-specific infant death from July 2014 to May 2018.

Study setting

The study was conducted in Agartala Government Medical College and G. B. Pant hospital and analysis conducted in Model Rural Health Research Unit, Khumulwng.

Study participant and data collection

Almost four year retrospective monthly infant mortality data which was generated from Paediatric Department as per national guidelines and stratified according to duration of survival.

Statistical analysis

All the infant death report formats were coded, data entered and analyzed in the SPSS software Version-25.

Ethics review

Data confidentiality was maintained and ethical clearance obtained from the Institutional Ethical Committee of Agartala Government Medical College and Hospital.

RESULTS

From 2014 to 2018 a total of 1525 infant deaths were recorded in the study facility, of these 998 (65.44%) were in the neonatal and 527 (34.56%) in the post-neonatal age group. Among the neonatal deaths, 878 (87.97%) were under early neonatal (<7 days) and 120 (12.02%) under late neonatal (8-28 days) mortality sub-group. Hence the pooled data of four years is analyzed below according to the time and cause of death. We developed the data as per district-wise causal distribution with respect to early, late and post neonatal infant mortality figures.

The demographic data obtained was stratified on the basis of early, late and post-neonatal infant mortality at the level of district, gender and ethnicity.

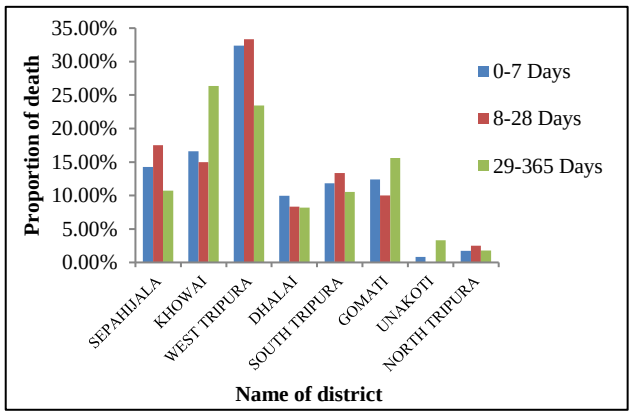

Figure 1: District-wise distribution of neonate and infant mortality (2014-2018).

Figure 1 shows the composite district-wise mortality data from 2014 to 2018 as per period of death. Highest number of early-neonatal deaths recorded from West Tripura district owing to the geographical location of the tertiary hospital. The trend declines after first week of life and again rises after a month. It is observed from the above table that the residents of Unakoti and North Tripura district utilized services poorly as compared to other districts, most likely due to geographical distancing.

Table 1: Distribution of infant and neonate mortality by gender.

Gender	Age-wise distribution (%)		P value
	Neonate (0-28 days)	Post-neonate (29-365 days)	
Male	596 (59.7)	287 (54.5)	0.048
Female	402 (40.3)	240 (45.5)	
Total	998 (100.0)	527 (100.0)	

Table 2: Distribution of infant and neonate mortality by ethnicity.

Ethnicity	Age-wise distribution		P value
	Neonate 0-28 days	Post-neonate 29-365 days	
Tribal	304 (30.5)	316 (60.0)	<0.01
Non-tribal	694 (69.5)	211 (40.0)	
Total	998 (100.0)	527 (100.0)	

Table 1 shows the distribution of neonatal mortality during study period on the basis of gender and age. The mortality rate was significantly higher in males as

compared to females in neonatal period (male 59.7%, female 40.3%) as well as in post-neonatal period (male 54.5%, female 45.5%). However, a gradual decline in male mortality was observed among infants in the post-neonatal period, whereas female death is seen to increase in contrast (p value ≤0.05).

Table 2 shows impact of ethnicity on infant mortality. The neonatal death (0-28 days) in ethnic population (30.5%) of Tripura is significantly lower than that in non-ethnic population (69.5%). However, this relation gradually reverses and a notable decline in mortality was observed among the non-ethnic and incline among the ethnic in the post-neonatal period (29-365 days) probably owing to social stigma prevalent during first month of life due to which fewer ethnic infants are admitted. There is a statistically significant association between ethnicity and infant mortality in both neonatal and post-neonatal period (p value ≤0.05).

The association between neonatal and post-neonatal mortality with causes of death within the first year of life during the study period is summarized in Table 3. It was observed that infants were more likely to have died due to preterm birth or low birth weight (OR=1.45, CI=1.14-1.86), perinatal asphyxia (OR=1.41, CI=1.10-1.81) and neonatal sepsis (OR=1.33, CI=0.82-1.56) in the first month of life as compared to mortality in the post-neonatal period. It was also found that neonates were at 35% less chances of succumbing to neurological infections (OR=0.65, CI=0.48-0.89) and congestive cardiac failure and 30% less chances of going into shock.

Table 3: Logistic regression analysis showing association between neonatal and post-neonatal infant mortality and cause of death (2014-2018).

	OR	95.0% C.I.		P value
		Lower	Upper	
Perinatal asphyxia (neonatal vs. post-neonatal)	1.411	1.100	1.810	0.007
Preterm and LBW (neonatal vs. post-neonatal)	1.453	1.137	1.857	0.003
Shock (neonatal vs. post-neonatal)	0.716	0.494	1.036	0.076
Sepsis (neonatal vs. post-neonatal)	1.133	0.820	1.564	0.449
Respiratory tract infection (neonatal vs. post-neonatal)	0.786	0.591	1.046	0.098
CNS infection (neonatal vs. post-neonatal)	0.659	0.486	0.895	0.008
Cardiorespiratory failure (neonatal vs. post-neonatal)	0.980	0.389	2.471	0.966
CHF and CCF (neonatal vs. post-neonatal)	0.665	0.390	1.134	0.134

*Statistical significance is set at p≤0.05. OR- Odd's ratio, CI- Confidence interval

On plotting the data on a timeline graph, a gradual incline in neonatal mortality was observed from the year 2014 with a peak in the year 2016, followed by a gradual decline towards 2018. This peak corresponded to all age-specific neonatal deaths. However, death during early-neonatal period was higher, followed by late-neonatal death during this period (Figure 2).

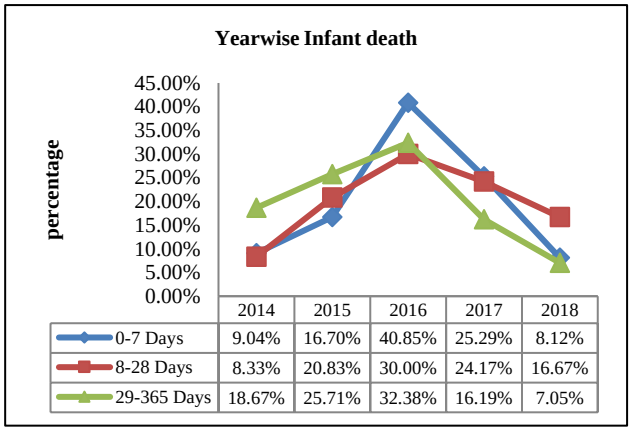

Figure 2: Year-wise distribution of age-specific infant mortality (2014-2018).

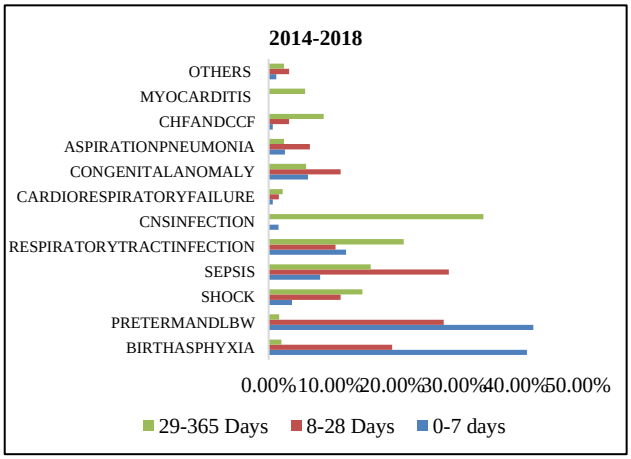

Figure 3: Cause-specific mortality fractions of infant mortality (2014 to 2018).

On plotting the yearly cause specific mortality fractions of early, late and post-neonatal deaths, from 2014 to 2018, a similar trend was observed throughout. In first seven days of life or early neonatal period, perinatal asphyxia and preterm/low birth weight were found to be the most predominant causes of mortality. In the late

neonatal period (8-28 days), a similar trend was seen. Thereafter, there is a rise in infant mortality due to sepsis and shock. In the post neonatal period (28-365 days), CNS and respiratory infections were the major causes of mortality. However, from 2016 septic shock appears to be the foremost cause of post-neonatal mortality. Thereafter the trend gradually declines, followed by a rise in death by sepsis. This rise in septic cases maybe due to fewer referral in preliminary stage subject to availability of services in the peripheral health center.

DISCUSSION

Demographic distribution of infant mortality

Geographically, the highest number of infant mortality was registered from West Tripura and lowest from North Tripura. The reason for this is possibly the location of the tertiary institution which makes it easily accessible in the West, and closer proximity of Northern phase to other health facilities. Mortality in both genders is highest in first week of life. In the present analysis, infant mortality among males was found to be higher than in females. Thereafter the post-neonatal female mortality elevates and a decline observed in males. The lower female mortality in neonatal state is likely due to biological factors which put female infants in an advantageous position compared to their male counterparts.[6] However, societal factors or lack of general care often cause rise in female mortality after the first month of life.

The mortality in ethnic infants showed a bimodal incline in the first week of life (early neonatal) and post neonatal period (>28 days). In the non-ethnic counterpart, although mortality is higher in the first week of life, as compared to ethnic neonates, but gradually declines. The mortality is seen to gradually increase among ethnic infants and decrease in non-ethnic infants after the first month of life. This may be due to factors such as differences in cultural traditions, socioeconomic condition, and availability of health care services.[7] It is to be mentioned here that fewer first week mortality among ethnic infants was recorded, which is possibly due to limited access to the facility owing to its geographical setting and availability of health services in the ethnic localities. The recorded infants were mostly referred cases from peripheral health centres. Nonetheless, this brings about a need to study the pre-natal scenario in both groups and confirm the underlying condition.

Etiological observations of infant mortality

This study shows that majority of infant deaths in the tertiary care hospital occurred within first week of life (57%) and the subgroup mortality was highest in neonates with body weight <2.5 kg. Prevalence of complications were significantly higher among the preterm group, mainly associated with low birth weight (35%) and incomplete organ function that possibly lead to perinatal asphyxia (34%) and respiratory tract infections (10%). Baqui et al reported that 70% of death due to LBW/prematurity and 100% deaths from neonatal asphyxia occurred during the first week of life.[8] Studies have shown that improving the nutritional status during pregnancy, increasing age of first parity, adequately spaced deliveries, proper monitoring and treatment of urinary and vaginal infections can help prevent preterm deliveries. Moreover, fortification of LBW/preterm neonates with vitamin A supplementation, breast feeding and avoiding hypothermia increases the survival rate.[9-15]Also, the protein and mineral deficit in normal human breast milk with respect to small infants (ELBW<1000 gm. and VLBW<1500 gm.) is of particular concern. This is an indication for the fortification of human milk in order to promote the rapid growth and bone mineralization in preterm infants.[16] To the purpose of reaching these milestones, strengthening of peripheral healthcare facilities and capacity development of healthcare workers at every level is essential, considering the lack of necessary skills at primary level in developing countries like India.[17,18]

After the first week, in late-neonatal period almost 30% of mortality is due to neonatal sepsis, followed by shock (11.67%) and congenital anomalies (11.67%) indicating exposure to infectious agents a major cause of post-neonatal mortality. Delayed referral can be an important factor for this. Further monitoring and surveillance of the same is required.

Records of death in post-neonatal (>1 month) period showed infective causes to be responsible for nearly 68% of mortality, comprising of CNS infection (29%), respiratory tract infection (18%), sepsis (14%), myocarditis (5%) and aspiration pneumonia (2%). The high incidence of neonatal sepsis in the late-neonatal period (7-28 days) can be correlated with findings of post neonatal infant mortality in the region. Previous studies have found that nearly one-fifth of infants with neonatal sepsis and half of those with positive culture findings die in the hospital. These neonates are at a greater risk of neurodevelopmental disabilities in the post-neonatal period.[19] Fresh data on district level indicators are urgently required to comprehend the magnitude and severity of the situation.

On tracing the mortality from 2014 to 2016, a gradual rise and decline with a peak in neonatal deaths was observed in the year 2016. The Health Management and Information System (HMIS) data by the Ministry of Health on infant mortality in Tripura for 2013-2014 also reflected this finding as a total of 345 infant deaths were reported across the state.[20] An increase in infant mortality rate has been witnessed since 2005-06 according to the National Family Health Survey (NFHS). However, the shrinking number recorded hereby, post 2016, implies an effort in the right direction at tertiary level. Further surveillance and in-depth research is essential in order to keep the state-wide infant mortality under check.

CONCLUSION

Although the leading causes of infant mortality in the region are in concordance with nationwide data, there was a significant load of CNS infections and perinatal asphyxia among neonates. The greater burden of preterm births and neonatal sepsis calls for stringent monitoring and attention towards ante-natal care along with holistic healthcare services. However, the study also suggests the competency of the prevalent practices and policies at tertiary level to ascend any untoward scenario. Hence, facilitation of early detection and referral for specialized care is imperative to the purpose. This reinforces the need for intensive and accelerated actions from both administration and healthcare to promote identification of red-flags at primary level followed by prompt referral from the periphery to tertiary care.

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