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Comparison of Neonatal Mortality Rates and Pattern in In-Born and Out-Born Babies in A Tertiary Care Hospital

KEYWORDS: Neonatal mortality, Respiratory distress, Birth asphyxia, Neonatal Intensive Care

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ABSTRACT ***Objective:*** *To compare neonatal mortality rates and patterns in In-born and Out-born babies in a tertiary care center in an urban area over a period of 4 years*

Methods : *It is a four year retrospective cohort study (January 2012 - December 2015) done from data collected from all neonatal admissions and deaths from the neonatal intensive care unit at Gandhi Hospital Secunderabad. .*

Results : *The number of In-born deliveries during the study period was 37379, out of which 6153 were admitted to the NICU. During the same period, there had been 3372 Out-born NICU admissions that were included in the study. The total number of deaths during the study period was 2110 (22.2%). In-born deaths were 1284 (20.9%) and Out-born deaths were 795(23.6%)*

Conclusions : *The neonatal mortality rate in the hospital is 22%. The main causes of death are respiratory distress and HIE/Birth asphyxia. The mortality rates and patterns of both In-born and Out-born are comparable to each other and consistent with the results of other national and international studies.*

INTRODUCTION

Neo-natal mortality is a matter of great concern to the Governments of most developing countries. The WHO Fact Sheet of January 2016[1] shows that every year nearly 45% of all under 5 child deaths are among newborn infants (babies in their first 28 days of life or the neonatal period) and that 75% of all new born deaths take place within seven days of the birth of the baby. In India, the neonatal mortality rate per 1000 live births is 29.2 (2013 WHO data). One of the main reasons for such a high mortality is that in developing countries like India, is that almost 50% of all mothers and newborns do not receive skilled care during and immediately after birth.

The WHO study[1] of 2016 reports that the main causes of newborn deaths are prematurity and low-birth weight, infections, birth asphyxia and birth trauma. These causes account for nearly 80% of deaths in this age group. In a global study[2] (Li Liu, 2012) of neonatal mortality, it was found that out 7·6 million deaths in children younger than 5 years in 2010, 64·0% (4·879 million) were attributable to infectious causes and 40·3% (3·072 million) of these deaths occurred in neonates. According to this study, preterm birth complications (14·1%), intra-partum-related complications (9·4%) and sepsis or meningitis (5·2%) were the leading causes of neonatal death. In a study conducted by Sarna et al[3] (1991) in an urban hospital in India, it was found that the single most important factor contributing to neonatal the mortality was respiratory distress (29.3%) followed by sepsis (24.4%) and birth asphyxia (16.2%). The WHO report of 2013 also showed a similar pattern. This is shown in Figure 1.

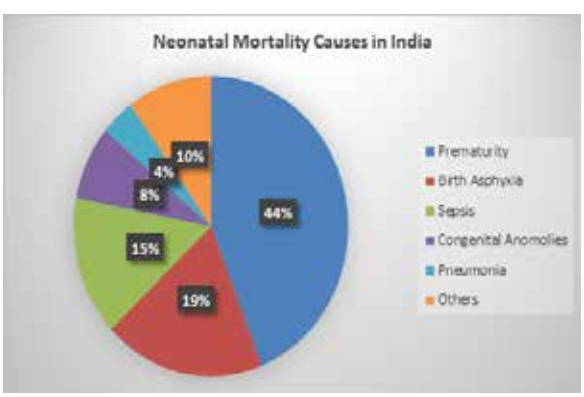

FIGURE 1

Therefore, the study of the pattern and causes of neonatal mortality is very important to both doctors and policy makers. Extensive research and data provides accurate information to medical administrators and policy makers to influence and mould Government policies on specific intervention strategies to prevent neonatal death. We hope that our study will also add to the growing medical literature on causes and patterns of neonatal deaths.

OBJECTIVE

The objective of the study was to examine the causes and rates of neonatal mortality in the neonatal intensive care unit of the tertiary care hospital, with specific reference to disparities if any among In-born and Out-born admissions.

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METHOD

A four year cohort study was done (January 2012 - December 2015) using data collected from all neonatal admissions and deaths from the neonatal intensive care unit (NICU) at Gandhi Hospital Secunderabad.The hospital has an obstetric unit, which also accepts high risk deliveries from other health institutes (un-booked cases) in addition to regular hospital mothers (booked cases). Babies who need acute care from these deliveries are transferred to the NICU. Such babies are referred to as In-born for the purposes of this study. In addition, the NICU also accepts high risk babies delivered at home or other health institutes in the region. Such admissions are referred to as Out-born in this study. High risk neonates are brought to the NICU due to serious sickness, lack of ventilators at the local health centers and financial constraints of the patients.

Data was collected on predesigned and approved data collection forms from the admissions and discharge registers at the NICU. The total number of live births was obtained from the Department of Obstetrics and Gynaecology, Gandhi Hospital. The In-born and Out-born babies are kept in separate units of the NICU. This facilitates data collection for both units. Total number of deliveries during the four year study period is 37,379 babies. Out of which 6153 were admitted to the NICU.

RESULTS

The number of In-born deliveries during the 4 year study period was 37379, out of which 6153 In-born were admitted to the NICU. During the same period, there were 3372 Out-born NICU admissions. Out of the total 9525 admissions in the NICU during the study period, the total number of deaths was 2110 (22.2%); the In-born deaths were 1284 (20.9%) and Out-born deaths were 795(23.6%).

Neonatal Mortality in In-Born Vs. Out-Born

The In-born mortality rate for each year from 2012 to 2015 is 21.5%, 18.5%, 21.7%, and 22% respectively .The Out-born mortality rate for each year from 2012 to 2015 is 24.5%, 22%, 23.3%, and 24.8% respectively. The mortalityrate difference (2.7%) between In-born and Out-born neonates does not appear to be statistically significant. A more vigorous statistical analysis may be required. The profile of admissions and deaths is shown in Table 1 below.

Table 1
PROFILE OF ADMISSIONS AND DEATHS

	Admissions					Deaths					
Year	Total Deliveries	In Born	Out Born	Total	% In born of Total Deliveries	In Born	% of In born Admissions	Out Born	% of Out born Admissions	Total	% of Total Admissions
2012	9162	1495	651	2146	16.32%	322	21.54%	160	24.58%	482	22.46%
2013	9353	1723	953	2676	18.42%	320	18.57%	210	22.04%	530	19.81%
2014	9503	1382	952	2334	14.54%	300	21.71%	222	23.32%	522	22.37%
2015	9361	1553	816	2369	16.59%	342	22.02%	203	24.87%	576	24.31%
TOTAL	37379	6153	3372	9525	16.4%	1284	20.9 %	795	23.6 %	2110	22.2%

Causes of Neonatal Mortality (In Born)

Though the total number of deaths for In-born is 1284, complete data on causes is available only for 1216 cases. The leading cause of In Born mortality in our NICU is due to respiratory Distress Syndrome accounting for 31.2%-37.8%. The next common cause is HIE/Birth asphyxia which is 27%, while sepsis accounts for 14% of the deaths. The details are shown in Table 2 and Figure 2.

Table 2 MORTALITY PROFILE—IN BORN

Year	2012		2013		2014		2015	
CAUSE	In Born	% of In born	In Born	% of Inborn	In Born	% of In Born	In Born	% of inborn
Respiratory Distress Syndrome	122	37.89%	100	31.25%	103	34.33%	99	36.13%
Meconium Aspiration Syndrome	19	5.90%	22	6.88%	13	4.33%	20	7.30%
HIE / Moderate – Severe Birth Asphyxia	81	25.16	98	30.63%	93	31.00%	64	23.36%
Sepsis / Pneumonia / Meningitis	52	16.15	39	12.19%	36	12.00%	45	16.42%
Major Congenital Malformation	22	6.83	17	5.31%	11	3.67%	3	1.09%

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Prematurity	14	4.35	21	6.56%	21	7.00%	11	4.01%
Others	12	3.73	23	7.19%	23	7.67%	32	11.68%
Total	322		320		300		274	

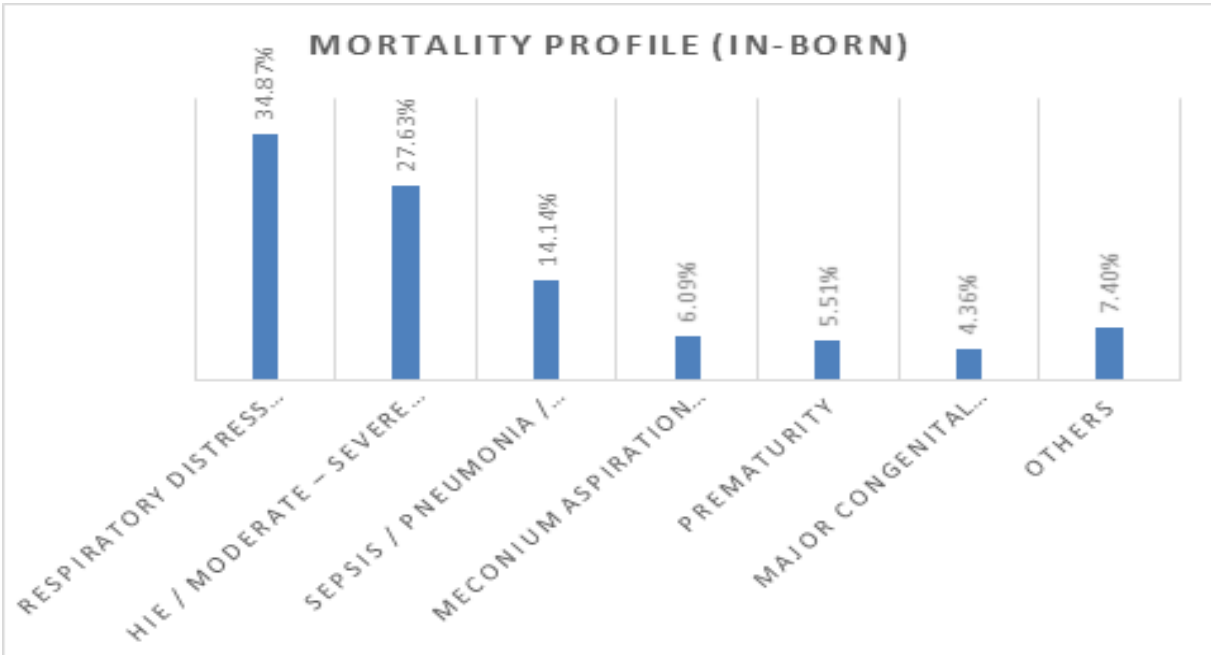

FIGURE 2
Causes of Neonatal Mortality (Out Born)

A similar pattern of mortality rates is seen in Out-born mortality also. Respiratory Distress accounts for 37.6% of death on average. HIE is the cause for 20.2% and Sepsis accounts for 15.6% of all deaths. The details are shown in Table 3and Figure 3 below.

Table 3 MORTALITY PROFILE—OUT BORN

Year	2012		2013		2014		2015	
CAUSE	Out Born	% of Out born	Out Born	% of Out born	Out Born	% of Out born	Out Born	% of Out born
Respiratory Distress Syndrome	57	35.63%	63	30.00%	97	43.69%	70	41.42%
Meconium Aspiration Syndrome	14	8.75%	13	6.19%	7	3.15%	10	5.92%
HIE / Moderate - Severe Birth Asphyxia	30	18.75%	45	21.43%	49	22.07%	32	18.93%
Sepsis / Pneumonia / Meningitis	28	17.50%	44	20.95%	25	11.26%	22	13.02%
Major Congenital Malformation	15	9.38%	6	2.86%	10	4.50%	1	0.59%
Prematurity	8	5.00%	15	7.14%	15	6.76%	10	5.92%
Others	8	5.00%	24	11.43%	19	8.56%	24	14.20%
Total	160		210		222		169	

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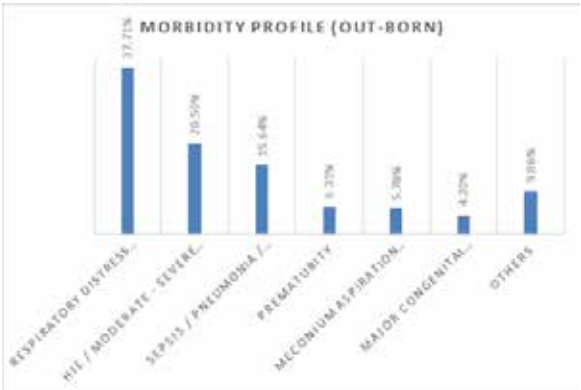

FIGURE 3

DISCUSSION

Neonatal mortality is a reliable index for evaluating the overall progress of neonatal and perinatal care in a community, which is a valuable indicator of the standard of a country's educational, social and community health system, the nutritional status of the population and the national medical programs in obstetrics and neonatal care

This study has shown that there is a consistent number of deliveries 9344/year and neonatal admissions 1538/yr from 2012 to 2015, which indicates the steady demand for perinatal and neonatal services at GMH. It also shows that the number of neonatal mortality rate has reached a plateau. This indicates the need to make new strategies to improvise both the perinatal and neonatal care to bring down the NMR.

The leading cause of In-Born mortality in our NICU is due to respiratory Distress Syndrome accounting for 31.2%-37.8%. Followed by HIE/Birth asphyxia which is on average 27% and Sepsis 14%. A similar pattern of mortality rates are seen in Out Born. Respiratory Distress accounts for 37.6% of death. HIE - 20.2% and Sepsis - 15.6% of all deaths. Surprisingly, there was no significant increase in mortality rates of Out-born compared to In-born. It may be due to increasing un-booked cases in the OBGYN department. This causal analysis can be pursued by doing a prospective analysis of mortality of booked verses un-booked mothers. A similar study was done in a pediatric ward of a secondary care level hospital in Bangladesh by Ali, Latif and Taher[4] (2009). The study period was six months, from 1st July 2006 to 31st December 2006 and among the 2638 pediatric patients, 909(34.46%) were neonate. The 6 month study revealed that the top three neonatal diseases were perinatal asphyxia (57.2%), neonatal septicemia (18.5%) low birth weight including very low birth weight (8.91%). Among admitted patient 70% were Out-born. However, separate data was not reported for Out-born and In-born respectively and no Out-born vs. In-born comparison was made.

It is relevant to review the results of similar studies in other developing countries which have similar socio-economic status as India. Abdellatif et al[5] (2013) reported a four year study exclusively of In-born neonates at the Sultan Qaboos University hospital NICU. The primary causes of neonatal deaths reported in this study were prematurity and its complications 52% (n=30), lethal congenital malformations lead to 17 (29%) newborn deaths, specific diagnosis in 7 newborns (12%), and birth asphyxia in four (7%) of cases. However, the total population of this study is quite small. In an evaluation of the prevalence and causes of neonatal mortality in an urban Pakistani population with access to obstetric and neonatal care by Imtiaz Jehan[6], the primary obstetric causes of death were preterm labour (34%) and intra-partum asphyxia (21%). This setting is similar to the setting of the present study, with a developing country like Pakistan and the hospital being in an urban area. Mmbaga et al[7] (2012) studies in Tanzania showed overall mortality was 10.7% (536 deaths) which is less than our hospital mortality rate Leading single causes of death were birth asphyxia (n = 245, 45.7%), prematurity (n = 188, 35.1%), congenital malformations (n = 49, 9.1%), and infections (n = 46, 8.6%).

Conclusions

The high rates of deaths from RDS, Birth asphyxia, MAS warrant a better perinatal care and prompt newborn resuscitation and ventilator care. We would recommend that institutions/hospitals with NICU to conduct ongoing NRP sessions, more trained staff and ventilator equipment supply, and good hand wash protocols to reduce sepsis

The high number of deaths attributable to birth asphyxia in normal birth weight babies suggests need for further studies to identify causal mechanisms. Strategies directed towards making obstetric and newborn care timely available with proper ante-natal, maternal and newborn care support with regular training on resuscitation skills would improve child survival.

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