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A Study of Referral Newborns to R.I.M.S, Ranchi and Their Outcome: A Hospital Based Study

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Abstract:
Objective: *The objective of the study is to document the morbidity and mortality pattern of outborn referral neonates referred to RIMS, Ranchi*
Materials and Methods: *This was a prospective observational study undertaken at a tertiary care teaching government hospital, for 1 year. All outborn referral neonates admitted were included in the study. Relevant maternal and neonatal data were included and analyzed.*
Results: *A total of 1880 outborn referral neonate were admitted during the study in which all neonates were included for analysis with 58.13% male and 41.86% female giving a male to female ratio 1.3:1. Most of them were from rural area and lower socioeconomic class. About 86.91% mothers were registered either at anganwadi, primary, secondary, or tertiaryhealth‐ care facilities. The average distance traveled by neonate was 84.81 km. The leading cause of admission was perinatal asphyxia (30.05%), prematurity with respiratory distress syndrome (24.04%), sepsis*(18.08%), *jaundice (10.85%) and others such as respiratory distress in term,IUGR, malformations, meconium aspiration syndrome, genetic syndrome,Surgical conditions and metabolic complications. Neonatal mortality rate was 31.22% and more than two‐ thirds deaths were within 1st week of life, with no sex predilection. The most common cause of mortality was perinatal asphyxia(37.81%), followed by prematurity with respiratory distress syndrome(34.07%) and sepsis(10.22%).*
Conclusion: *Neonatal mortality was 31.22% in our study. Perinatal asphyxia, prematurity with respiratory distress and systemic infection were the leading causes of admission in our study.These preventable causes should be urgently addressed if we hope to achieve the millennium developmental goal.*
Keywords: *Morbidity, neonatal mortality, outborn neonate, referral neonate*

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I. Introduction

Neonatal period is the most vulnerable period of human life as it accounts for very high morbidities and mortalities and most of these are preventable. It is estimated that 130 million neonates are born each year and out of these, 4 million die in the first 28 days of their life, and 75% of neonatal deaths occur in the 1st week. The global burden of neonatal death is primarily concentrated in the developing countries where care of neonate is practically nonexistent. India contributes to one-fifth of global live births and more than a quarter of neonatal death. In India, nearly 0.75 million neonates died in 2013, the highest for any country in the world and the current neonatal mortality rate is 25.4 per 1000 live births with interstate, rural‐ urban variation and in most backward and disadvantaged population especially scheduled caste and scheduled tribe population. Globally, prematurity (29%), infections (29%), asphyxia (23%), congenital malformations (8%), and other (11%) are important causes of neonatal death in low‐ income country while prematurity and malformation contribute in developed countries. Accurate assessment of morbidity and mortality pattern of neonates are reported in generally inborn babies treated in the neonatal intensive care unit. However, accurate data of outborn neonates is scanty. Outborn neonates have been previously admitted to a different institution or might be home delivered, and sometimes older at the time of admission. Due to above‐ mentioned differences, morbidity and mortality pattern may be different from those found in the inborn unit and such data are lacking in India and globally. With this background, this study aims to document the morbidity and mortality pattern of these neonates and review their management to identify areas that need improvement, to optimize their care.

II. Materials And Methods

This was a prospective observational study undertaken at one of the largest tertiary care teaching government referral hospital,RIMS,Ranchi that provide care to underprivileged,socioeconomically deprived population of eastern India (Jharkhand,west Bengal and bihar) over a period of 1 year from April 2018 to March 2019. In pediatric speciality, there are two wards of 60 beds in each and four units working functionally by rotation,16 bedded Neonatal Intensive Care Unit and 06 bedded Pediatric Intensive Care Unit functioning effectively with 08 teaching faculty and 34 postgraduate resident and inadequate quantity of nursing staff. There are insufficient phototherapy machines, multipara monitor, and ventilators for caring of neonate at Neonatal Intensive Care Unit (NICU).

All outborn referral neonates admitted through either outpatient or emergency department were included in study. Data were collected following admission, from either the mother or caregiver in a specially designed proforma for study. The data extracted include maternal age, gravida, parity,

previous abortion, availability of health facility, antenatal care provider, either booked or unbooked, distance from institute, referral person, maternal diseases, obstetrics complications, mode of delivery, and place of delivery.

Neonatal data, including gestational age, gender, age at admission, weight at admission, diagnosis at admission, duration of hospital stay, and Apgar score were noted either from available document or estimated from mothers based on data whether baby cried immediately after birth, details of activity, color, and respiratory effort of the newborn after birth. The 5 min Apgar score was used to diagnose and grade the degree of perinatal asphyxia. Temperature was recorded at the time of admission.

All neonates were observed for clinical status and management plan such as antibiotic use, respiratory support ,fluid therapy,blood transfusion, exchange transfusion, phototherapy, method and type of feeding till discharge or death. Diagnosis of neonatal illness and estimation of the cause of death was done using clinical information and necessary laboratory investigations.

III. Results

A total of 1880 outborn referral neonate were admitted during the study period of one year and all 1880 neonates were included for the data analysis of which 1093 (58.13%) were male and 787 (41.86%) were female giving a male to female ratio 1.3:1 and most of them were from rural area and from lower socioeconomic class. Out of 1880 mothers, only 1634 mother were registered case either at anganwadi, primary, secondary, or tertiary health- care facilities. 1036 mother received antenatal care from medical officer. 1468 (78.08%) neonates were referred by medical officer and 474(32.28%) neonates died. 338 (17.97%) neonates referred by paramedical persons and 118(34.91%) died. Mortality was not statistically significant between referral person. Average distance traveled by neonate who couldnot survived was 96.13 ± 77.58 Km and 84.81 ± 68.96 Km in neonates who survived and this difference was statistically significant (P = 006). Maternal anemia was the most common comorbid condition followed by hypertention,sickle cell disease and diabetes.Obtructed labour was the commonest obstetric complication followed by preeclampsia and eclampsia during labor. 1506 (80.01%) neonates were delivered by vaginal route and 374 (19.89%) by cesarean section and 1730 (92.02%) deliveries were occurred in either primary, secondary, or tertiary care level hospital. 1198(63.72%) neonates were term and 676 (35.95%) were preterm. 892 (47.44%) neonates were average birth weight, 602 (32.02%) low birth weight, 280 (14.89%) very low birth weight, 88 (04.68%) extremely low birth weight, and 18 (0.95%) were above averag[Table 1].

Table 1: Sociodemographic, maternal, and neonatal profile of the study population

Variables	Total admission{n=1880}	percentage(%)
Age at admission		
<1 day	320	17.02
1-3days	680	36.17
4-7days	700	37.23
>7days	180	09.57
Gender		
Male	1093	58.13
Female	787	41.86
Residence		
Rural	1240	65.95
Urban	640	34.04
Socioeconomic status		
Lower	1130	60.10
Middle	640	34.04
Upper	110	05.85
Gestational age		
Preterm	676	35.95
Term	1198	63.72

Postterm	6	0.31
	Weight on admission	
Average	892	47.44
LBW	602	32.02
VLBW	280	14.89
ELBW	88	04.68
Above average	18	0.95
	Mode of delivery	
Vaginal	1506	80.01
Caesarean section	374	19.89
	Place of delivery	
Home	106	05.63
Hospital	1730	92.06
Other	44	02.3
	Maternal diseases	
Anemia	1320	70.52
Diabetes	30	01.59
Hypertension	140	07.44
Sickle cell disease	54	02.87
Chronic kidney diseases	12	0.63
Heart disease	12	0.63
	Obstetric complications	
Obstructed/prolong labour	240	12.74
Gestational diabetes	38	02.02
Preeclampsia/eclampsia	204	10.85
APH/PPH	82	04.36
Intrapartum fever	30	01.59

The leading cause of admission were perinatal asphyxia (30.05%), prematurity with respiratory distress syndrome (RDS) (24.04%), sepsis(18.08%), jaundice (10.85%), and other morbidities that necessitated admission such as IUGR, malformations, meconium aspiration syndrome, genetic syndrome,Congenital heart desease and metabolic complication as shown in Table 2.

Table 2: Morbidity pattern of outborn referral neonate admitted in NICU

Clinical diagnosis	**Total admission(*n*=1038)**	**Percentage(%)**
Perinatal asphyxia	565	30.05
Prematurity with RDS	452	24.04
Respiratory distress (other)	80	04.25
Neonatal sepsis	340	18.08
Jaundice/kernicterus	204	10.85
Intrauterine growth		
Retardation[IUGR]	78	04.14
MAS		
Others[CHD,Cong. Malformation, Hypoglycemia,syndromic]	61	03.24
Surgical condition	40	02.12

A total of 587 neonatal deaths were recorded during the study accounting for 31.22% of the total neonatal admissions. Out of this number, 295 were male and 292 were females giving a male to female ratio of 1.01:1. The most common cause of mortality was perinatal asphyxia (37.81%), followed by Prematurity with RDS (34.07%) , neonatal sepsis(10.22%) and other causes as shown in table 3.

Table 3: Mortality pattern of outborn referral neonate admitted in NICU

Clinical diagnosis	**TotaL Death (*n*=587)**	**Percentage(%)**
Perinatal asphyxia	222	37.81
Prematurity with RDS	200	34.07
Respiratory distress (other)	20	03.40
Neonatal sepsis	60	10.22
IUGR	45	07.66
MAS	16	02.72
Others(CHD,Syndromic,Cong. Malformation etc)	24	04.08

RDS – Respiratory distress syndrome; MAS – Meconium aspiration syndrome; CHD-Congenital heart desease. About 81.77% neonatal deaths were in 1st week of life and half of them in first 24 h of life [Table 4].

Table 4: Outcome in relation to age at admission

Age at admission (days)	**Death (*n*=332)**	**Percentage(%)**
<1 day	**242**	**41.22**
1-3 days	**140**	**23.85**
4-7 days	**98**	**16.69**
>7 days	**107**	**18.22**

Table 5; Outcome of outborn referral morbid neonates after nicu admission:

Outcome	Number	Percentage
Discharge	1073	57.07
Death	587	31.22
LAMA	220	11.70

IV. Discussion

Documentation of morbidity and mortality data is very important and beneficial for the health‐ care provider, investigators, researchers, and the decision makers to design intervention for prevention and treatment and hence improving the quality of care. Most published data studies on neonatal morbidity and mortality in the world are of inborn neonates.. Very few studies have been conducted on outborn referral neonates which were managed at suboptimal care and treated in general pediatric wards.

In the present study, most of the neonates were male (male:female ratio 1.30:1) of rural areas and from low socioeconomic class. The sex distribution is in concordance with the National Neonatal Perinatal Database (NNDP) and other studies. Such male predominance in this study may be due to gender bias in India where male babies are given more care and biological vulnerability of male neonate. Our institute is the largest referral tertiary care and caters to the underprivileged and socioeconomically deprived population, so most of the cases were referred from rural areas. As the management, complications, and prognosis of neonates depends on gestational age and birth weight, we classified the neonate into preterm, term, postterm and average birth weight, low birth weight,very low birth weight,extremely low birth weight and above average weight as per the WHO classification.

The average distance traveled by neonate is 84.81 km. Hence, the safe transport facility should be improved. In the present study, the most common cause of admission were perinatal asphyxia (30.05%), respiratory distress due to prematurity (24.04%), neonatal sepsis(18.08%),jaundice (10.85%),and respiratory distress other than prematurity (4.25%).Our data is not similar to NNDP which showed morbidity pattern as systemic infections (28.4%), perinatal asphyxia (23%), prematurity (29%), congenital malformation (8%), and other causes (11%). In the developed countries, the scenario is different with extreme prematurity, malformation, and congenital anomalies being the major causes of admission as reported by Fahmy et al from Egypt and Simpson et al. from Canada.[18]

We observed perinatal asphyxia (37.81%) was the major cause of death followed by prematurity with RDS (34.07%), neonatal sepsis (10.22%), respiratory distress other than prematurity (3.40%), IUGR (7.77%), meconium aspiration syndrome (2.72%) and other miscellaneous causes(4.08%). Our results are in concordance with the Indian and Asian studies with slightly higher incidence of perinatal asphyxia. The results are in contrast to developed countries where extreme prematurity‐ related conditions and congenital malformations are the main cause of mortality as better neonatal care and safe, timely transport facility ensure lesser sepsis and better survival of neonates with respiratory distress.[18] The neonatal mortality rate in our study was 31.22% and 81.77% deaths were in the 1st week of life and half of them in first 24 h of life which was quite higher than other studies from different parts of India. The likely causes for this high mortality rate are as follows:

• Most of the neonates were delivered by vaginal route at primary or secondary health‐ care level by paramedical workers with inadequate aseptic precaution and untrained in neonatal resuscitation

• Transport of sick neonate from a long distance without medical supervision and proper transport facility

• Lack of facility for immediate surgical intervention in case of fetal distress

• Our NICU is 16 beded but daily occupancy is thrice the upper limit resulting in overcrowding,inadequate nurse to patient ratio and compromised management of newborn.

V. Conclusion

Perinatal asphyxia, prematurity with respiratory distres and neonatal sepsis were the leading causes of admission in our study. Neonatal mortality was 31.22% and more than two‐ third deaths were within 1st week of life. Perinatal asphyxia, prematurity with RDS, sepsis and IUGR were the important preventable causes of mortality, which must be urgently addressed, if India hopes to achieve Millennium Developmental Goals. There is urgent need to provide better neonatal care for referral outborn neonate in intensive care unit as they are more vulnerable for acquiring infection and high mortality.

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