

## A Clinic-Epidemiological Study to Assess the Risk Factors and Outcome of the Neonates Treated at Tertiary Care Facility

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Conflict of interest: Nil

### Abstract

**Aim:** The aim of the present study was to assess the common complications of the neonates.

**Methods:** A facility-based retrospective study was conducted among neonates born at JLNMCB, Bhagalpur, Bihar, India for 10 months, and some mother delivered at other hospital and came for the treatment as out-patient or in-patient to the JLNMCB, Bhagalpur, Bihar, India. In-patients and Out-patients born/attended the Hospital during the study period were about 294 neonates. The researcher included all the Neonates born/attended at the hospital (Normal delivery or by Caesarean) in this study.

**Results:** Male ratio was higher than the female ratio in the present study. Regarding Neonates age, the highest percentage (male-41.83% and female-37.41%) was observed during the stay in the hospital is in 1-5 days group (average mean value was 39.62). In other age groups, the percentages were very low. In the study area, most of the ladies (90.10%) were delivered their babies in term (47.61% males and 43.19% females). But less percentage of ladies delivered with preterm babies (4.42% males and 4.76% of females). Highest percentage (72.10%) of neonates (33.67% of male and 38.43% of females) has the birth weight of 3-4kgs and followed by 1-2 kgs. Very few neonates were born with 5-6kgs at birth weight. Average birth weights of the neonates are 3.2kgs.

**Conclusion:** Neonatal jaundice (51.01%), sepsis(17.00%), low birth weight, preterm birth, TTN, RDS and MAS were the most common morbidities. 89.77% of the babies were undergone phototherapy and 79.91% of babies treated with First line antibiotics. The overall mortality rate was 8.33% with more death during mechanical ventilation usage. Strengthening perinatal care, emergency obstetric care services and neonatal resuscitation skills are necessary to reduce the neonatal complications and mortality.

**Keywords:** neonatal jaundice, sepsis, neonatal mortality

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### Introduction

Most of the newborn's transition from fetal to extra-uterine life uneventfully. However, approximately 1 in 10 will require some assistance after delivery to initiate or sustain the health of Neonates. Common complications in neonates are Neonatal Jaundice, Respiratory distress, Hypoglycemia, sepsis etc. Intrapartum factors may also complicate fetal transition, including assisted delivery, cesarean delivery, abnormal fetal lie, presence of meconium and placental complications. Post-term and premature discrepancies pose additional risks for poor transition. An anticipated compromised birth warrants the presence of personnel who can initiate and sustain resuscitation, including use of ventilator support, chest compressions and selected medications. However, risk factors are not always apparent and providers must be able to anticipate and intervene quickly to support the compromised newborn. Three assessment prompts will assist with quick identification of newborns that will require

support: Is the baby term? Is the baby breathing? Is there good muscle tone? (Lori O'keefe, 2011). [1]

A significant proportion of term and preterm infants develop neonatal jaundice. Jaundice is caused by an increase in serum bilirubin levels, largely as a result of breakdown of red blood cells. Bilirubin is conveyed in the blood as 'unconjugated' bilirubin, largely bound to albumin. The liver converts bilirubin into a conjugated form which is excreted in the bile. Very high levels of unconjugated bilirubin are neurotoxic. Phototherapy is a simple and effective way to reduce the bilirubin level (Mitra and Rennie, 2017). [2]

Neonatal sepsis is a kind of neonatal contamination and particularly includes to the nearness in an infant of a bacterial circulatory system disease (for example, meningitis, pneumonia, pyelonephritis, or gastroenteritis) in the setting of fever (Sowmya et al., 2016). [3] Premature newborns face an increased

risk of one or more complications. It might not be able to resist certain infections. Neonates are placed in an incubator to provide protection against these infections (Randis, 2008). [4] Kim et al., (2020) [5] treated the neonatal sepsis with Streptococcus sp. by ampicillin and ceftriaxone

The aim of the present study was to assess the common complications of the neonates.

**Materials and Methods**

A facility-based in prospective study was conducted among neonates born at JLNMCH, Bhagalpur, Bihar, India for 10 months, and some mother delivered at other hospital and came for the treatment as out-patient or in-patient to the JLNMCH, Bhagalpur, Bihar, India. In-patients and Out-patients born/attended the Hospital during the study period were about 294 neonates. The researcher included all the Neonates born/attended at the hospital (Normal delivery or by Caesarean) in this study.

**Data Collection Methods**

Data were collected using a questionnaire by an expert nurses and Pediatrician and from the follow-up checklist. The main outcomes and causes of death were set by pediatrician (researcher) and medical residents.

Maternal and demographic data were obtained by interviewing the mothers or reviewing the referral records by neonatal nurses and each neonate was monitored daily until discharged or died. A final assessment of the Neonates health was determined by a pediatrician or pediatric resident after conducting the necessary laboratory investigation and a thorough review of medical records. Complete Blood Count (CBC) data like C-reactive protein (CRP), White Blood Corpuscles (WBC) and Platelets (PLT) were measured using full automatic CBC analyzer.

**Results**

**Table 1: Distribution of Neonates in Age (Days) and Gender**

Age (Days)	Male		Female		Mean	P-Value
	No.	%	No.	%		
1-5	123	41.83	110	37.41	39.62	0.0234
6-10	008	02.72	004	01.36	02.04	
11-15	005	01.70	004	01.36	01.53	
16-20	005	01.70	010	03.40	02.55	
21-25	002	00.68	003	01.02	00.85	
26-30	014	04.76	006	02.04	03.40	
Total	157	53.39	137	46.59	49.99	

Male ratio was higher than the female ratio in the present study.. Regarding Neonates age, the highest percentage (male-41.83% and female-37.41%) was

observed during the stay in the hospital is in 1-5 days group (average mean value was 39.62). In other age groups, the percentages were very low.

**Table 2: Distribution Neonates Birth in Terms or Preterm**

Birth	Male		Female		Mean	P-Value
	No.	%	No.	%		
Term	140	47.61	127	43.19	45.4	0.0012
Preterm	013	04.42	014	04.76	04.59	
Total	153	52.03	141	47.95	49.99	

In the study area, most of the ladies (90.10%) were delivered their babies in term (47.61% males and 43.19% females). But less percentage of ladies delivered with preterm babies (4.42% males and 4.76% of females).

**Table 3: Relationship of Birth Weight with Gender of the Neonates**

Birth weight (kg)	Male		Female		Mean	P-Value
	No.	%	No.	%		
1-2	38	12.92	041	13.94	13.43	0.0038
3-4	99	33.67	113	38.43	36.05	
5-6	02	00.68	001	00.34	00.51	
Total	139	47.27	155	52.71	49.99	

Highest percentage (72.10%) of neonates (33.67% of male and 38.43% of females) has the birth weight of 3-4kgs and followed by 1-2 kgs. Very few neonates were born with 5-6kgs at birth weight. Average birth weights of the neonates are 3.2kgs.

**Table 4: Relationship of Birth Weight with the CBC parameters level of the Neonates**

Birth weight (kg)		CRP level		WBC Level		PLT Level	
		No.	%	No.	%	No.	%
1-2	Low	022	07.48	018	6.12	23	07.82
	Normal	036	12.24	042	14.28	34	11.56
	High	021	07.14	019	6.46	22	07.48
3-4	Low	066	22.44	052	17.68	62	21.08
	Normal	103	35.05	123	41.83	98	33.33
	High	043	14.62	037	12.58	52	17.68
5-6	Low	002	00.68	00	00	00	00
	Normal	001	00.34	001	00.34	01	00.34
	High	000	00	002	00.68	02	0.68
Total		294	99.99	294	99.97	294	99.97

During correlation of the birth weight with the CBC parameters of neonates, the maximum percentages of neonates with all parameters (CRP, WBC and PLT level) were observed normal.

**Table 5: Risk factors of Neonates in the study**

Risk Factors	Male		Female		Mean	P-Value
	No.	%	No.	%		
Neonatal Jaundice	82	27.89	68	23.12	25.05	0.00112
Sepsis	29	09.86	21	7.14	08.50	
IDM	05	01.70	02	0.68	01.19	
NJ+Sepsis	26	08.84	29	9.86	09.35	
NJ+TTN	02	00.68	07	2.38	01.53	
NJ+RDS	01	00.34	05	1.70	01.02	
NJ+MAS	05	01.70	02	0.68	01.19	
MAS+TTN	00	00	00	00	00	
NJ+Sepsis+TTN	03	01.02	02	0.68	0.85	
NJ+Sepsis+IDM	04	01.36	01	0.34	0.85	
Total	157	53.39	137	46.58	39.48	

Risk factors like Neonatal Jaundice, Neonatal Sepsis, Infant Diabetic Mother, Transient Tachypnea, Respiratory Distress Syndrome, Meconium Aspiration Syndrome were observed in this study either alone or mixed complications. Neonatal Jaundice placed first with the mean value of 25.05 in the Neonatal complications in this study.

Sepsis alone and joint with Neonatal jaundice stand in the second risk factors (average mean value of 8.50 for Sepsis and 9.35 for the combined complications of Sepsis and Neonatal jaundice) among the neonates warrant more attention of Pediatricians care and treatment.

**Table 6: Relationships of Neonates' Risk factors and Treatments**

Risk factors	Light		Blood Transfusion		Exchange Transfusion		Antibiotics					
	No.	%	No.	%	No.	%	I Line		II Line		III Line	
							No.	%	No.	%	No.	%
NJ	119	40.47	06	2.04	03	1.02	77	26.19	18	6.12	00	00
Sepsis	030	10.20	02	0.68	00	00	38	12.92	12	4.08	00	00
IDM	008	02.72	00	00	00	00	04	01.36	00	00	00	00
NJ+Sepsis	039	13.26	04	1.36	03	1.02	52	17.68	04	1.36	02	0.68
NJ+TTN	012	04.08	00	00	02	0.68	06	02.04	01	0.34	00	00
NJ+RD	007	02.38	01	0.34	00	00	03	01.02	02	0.68	00	00
NJ+MAS	012	04.08	01	0.34	02	0.68	02	00.68	00	00	00	00
MAS+TTN	011	03.74	01	0.34	01	0.34	11	03.74	08	2.72	00	00
NJ+Sepsis+TTN	020	06.80	04	1.36	00	00	22	07.48	07	2.38	01	0.34
NJ+Sepsis+IDM	006	02.04	00	00	00	00	20	06.80	04	1.36	00	00
Total	264	89.77	19	6.46	11	3.74	235	79.91	56	19.04	03	1.02

About 89.77% (40.47% of neonates suffer with Neonatal jaundice, 10.20% with Sepsis, 13.26% with combined Sepsis and Neonatal jaundice etc.) of neonates treated with phototherapy. Antibiotic treatment was done mainly

with First line antibiotics to 79.91% of Neonates. 6.46% of neonates from this study population got blood transfusion. Rarely 3.74% of neonates got Exchange transfusion.

**Table 7: Reason of Mortality Rate of Neonates**

Neonatal Mortality	Male		Female		Mean	P-Value
	No.	%	No.	%		
Congenital Anomalies	02	0.68	01	0.34	0.51	0.0027
Septic Shock	01	0.34	00	0	0.17	
Mechanical Ventilation	04	1.36	03	1.02	1.19	
Others	06	2.04	06	2.04	2.04	
Total	13	4.42	10	3.4	3.91	

Neonatal mortality in this study is about 4.42% in males and 3.91% in females. Females' mortality rate is observed lower than the male.

### Discussion

Premature neonates have an increased incidence of congenital anomalies and major congenital anomalies are an independent risk factor for pre-term birth. [6] Neonatal the first 28 days of life is the most vulnerable period of childhood and almost half of all neonatal deaths are in the first 24 hours of life. [7]

Male ratio was higher than the female ratio in the present study.. Regarding Neonates age, the highest percentage (male-41.83% and female-37.41%) was observed during the stay in the hospital is in 1-5 days group (average mean value was 39.62). In other age groups, the percentages were very low. In the study area, most of the ladies (90.10%) were delivered their babies in term (47.61% males and 43.19% females). But less percentage of ladies delivered with preterm babies (4.42% males and 4.76% of females). Highest percentage (72.10%) of neonates (33.67% of male and 38.43% of females) has the birth weight of 3-4kgs and followed by 1-2 kgs. Very few neonates were born with 5-6kgs at birth weight. Average birth weights of the neonates are 3.2kgs. Risk factors like Neonatal Jaundice, Neonatal Sepsis, Infant Diabetic Mother, Transient Tachypnea, Respiratory Distress Syndrome, Meconium Aspiration Syndrome were observed in this study either alone or mixed complications. Neonatal Jaundice placed first with the mean value of 25.05 in the Neonatal complications in this study. Sepsis alone and joint with Neonatal jaundice stand in the second risk factors (average mean value of 8.50 for Sepsis and 9.35 for the combined complications of Sepsis and Neonatal jaundice) among the neonates warrant more attention of Pediatricians care and treatment. Many early neonatal infections can be prevented by avoiding unnecessary separation of the newborn from the mother e.g. baby unit (Shane and Stoll, 2014). [8] Hand-washing before delivering and handling the

infants, good basic hygiene and cleanliness during delivery (e.g. chlorhexidine cream for all maternal vaginal examinations) (Puopolo et al., 2011). [9] Appropriate umbilical cord care and appropriate eye care (Turin et al., 2014). [10]

Neonatal mortality in this study is about 4.42% in males and 3.91% in females. Females' mortality rate is observed lower than the male. The total mortality rate is 8.33%. In addition, more mortality rate (2.38%) was observed with the known cause like Mechanical ventilation. This result is very much similar to the study result of Alburke et al., (2015) [11] at Misurata Teaching Hospital, Libya. Low neonatal mortality incorporates Europe, the Western Pacific, and the Americas, which have sepsis rates that record for 9.1% to 15.3% of the aggregate neonatal passing's around the world. This is interestingly with the 22.5 to 27.2% rate of aggregate passing's in asset poor nations, for example, Nigeria, the Democratic Republic of the Congo, India, Pakistan, and China (Sowmya et al., 2016). [12]

### Conclusion

Neonatal jaundice (51.01%), sepsis(17.00%), low birth weight, preterm birth, TTN, RDS and MAS were the most common morbidities. 89.77% of the babies were undergone phototherapy and 79.91% of babies treated with First line antibiotics. The overall mortality rate was 8.33% with more death during mechanical ventilation usage. Strengthening perinatal care, emergency obstetric care services and neonatal resuscitation skills are necessary to reduce the neonatal complications and mortality.

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