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Original Research Article

A Prospective Study on Causes, Preventive Measures, and Early Complications of Neonatal Jaundice in a Hospital Setting

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Abstract:

Background: Newborn jaundice is a common clinical condition and a leading cause of newborn morbidity and hospitalizations. Physiological jaundice is typically benign, but severe hyperbilirubinemia can lead to significant neurological consequences if not detected and treated early.

Aim: To study the etiological causes, preventative strategies and early consequences of newborn jaundice in a hospital-based environment.

Methods: This was prospective observational research undertaken at the Department of Paediatrics, Sheikh Bhikhari Medical College Hospital, Hazaribagh, Jharkhand for one year. A total of 90 newborns diagnosed with Jaundice were studied. Information about demographics, clinical characteristics, gestational age, birth weight, onset and severity of jaundice, etiological causes, preventative behaviors, therapy and complications was gathered on a standardized proforma. Data was analyzed using SPSS version 27.0 where $p < 0.05$ was considered statistically significant.

Results: Most newborns (53.3%) were male and presented within 4–7 days of life. 66.7% were term newborns, and 26.7% were low-birth-weight infants. Moderate jaundice was observed in 37.8% of cases, whereas 44.5% had severe to very severe jaundice. Septicemia was the most common cause (24.4%), followed by physiological jaundice (20%) and birth asphyxia (15.6%). Adequate preventive behaviors were observed in 57.8% of cases. Phototherapy was the first-line treatment for 64.4% of newborns. Complications were observed in 66.7%, and severe jaundice was significantly associated with low birth weight ($p<0.05$).

Conclusion: Neonatal jaundice is a serious health problem. Early diagnosis of risk factors, effective preventative measures and prompt therapy are crucial to decrease complications and enhance infant outcome.

Keywords: Neonatal jaundice, Hyperbilirubinemia, Neonatal sepsis, Phototherapy, Low birth weight, Neonatal complications, Preventive practices, Kernicterus.

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Introduction

Neonatal jaundice is a clinical sign of increased total serum bilirubin (TSB), known as neonatal hyperbilirubinemia, resulting from bilirubin accumulation in an infant's skin. It is characterized by yellow discoloration of the skin, sclerae, and mucous membranes. The term jaundice derives from the French word jaune, meaning yellow.

Neonatal jaundice was perhaps first documented in a Chinese textbook a millennium ago. Medical theses, articles, and textbooks from the 18th and 19th centuries contain analyses of the etiology and management of newborn jaundice. Numerous authors also describe a fatal trajectory in newborns likely affected by Rh isoimmunization. In 1875, Orth initially identified yellow staining of the brain, a finding subsequently termed kernicterus by Schmoll [1].

Neonatal jaundice is a common condition affecting 60% of full-term and 80% of preterm infants within the first three days of life [2]. More than two-thirds of neonates develop clinical jaundice, and by adult criteria, nearly all newborns are considered 'jaundiced' in the first few days of life. Yellow discoloration initially appears on the face, particularly in the nasolabial creases and near the tip of the nose [3]. Newborn jaundice may not be a major cause of

death; however, it is a notable source of morbidity throughout the newborn period and beyond [4].

Due to severe problems, including kernicterus and various aberrant psychomotor and neurological sequelae resulting from hyperbilirubinemia, early identification and appropriate care to avert these complications are crucial. Prematurity is the primary determinant of vulnerability to bilirubin encephalopathy [5]. Evaluating the causes and risk factors is crucial for effective management.

However, significant disparities persist between high-income nations and low- and middle-income countries (LMICs). In resource-constrained environments, newborn hyperbilirubinemia continues to be a predominant cause of avoidable infant death and impairment, attributable to systemic disparities in bilirubin measuring methods, availability of phototherapy devices, and carer health education.

Jaundice is the leading cause of medical intervention and hospital readmission in neonates. The yellow discoloration of the skin and sclerae in neonates with jaundice results from the buildup of unconjugated bilirubin. In most infants, unconjugated hyperbilirubinemia is a transient, normal finding. In some neonates, bilirubin levels may rise excessively, raising concerns because of the neurotoxicity of unconjugated bilirubin IXα (Z, Z), which can result in mortality in newborns and lifelong neurological complications in survivors (kernicterus) [7]. Consequently, newborn jaundice often necessitates medical assessment.

The causes of newborn jaundice can be many, including both physiological and pathological factors. Physiological jaundice frequently manifests in healthy neonates owing to the young liver's inefficiency in processing bilirubin effectively. Pathological causes may include hemolytic disorders, such as Rh or ABO blood group incompatibility, as well as hepatic illnesses or infections.

Given the variety of classifications for newborn jaundice and hyperbilirubinemia, determining the magnitude of the problem in neonatal facilities across different countries or locations is challenging. In the United States, the National Collaborative Perinatal Project found that 6.2% of babies weighing more than 2500g had blood bilirubin concentrations above 220 umol/l (12.9 mg/dl). In contrast, data from 12,587 newborns (weighing 2500g or more) born in Singapore between 1986 and 1989 [8] showed a lower prevalence of this type of neonatal jaundice at 4.6%. Even though Asian full-term newborns are typically smaller, when normal birth weight is defined as more than 2270g, the incidence remains at just 5.2%.

Infants within this bilirubin concentration range were monitored. Our proactive strategy for managing newborn jaundice, characterized by enhanced access to phototherapy equipment and a more permissive approach to initiating treatment in mild cases, is thought to have reduced the incidence of severe jaundice [8].

Given the high incidence of newborn jaundice and its potential to cause significant neurological morbidity if inadequately addressed, a rigorous assessment of its underlying causes and preventive measures is essential, especially in resource-constrained hospital settings. Timely identification of etiological factors and the implementation of effective preventive strategies are essential for mitigating disease burden and consequences. This prospective study was conducted in a tertiary care hospital to examine the causes of newborn jaundice, assess preventive measures implemented by caregivers and healthcare professionals, and analyze early problems in affected neonates. This study's findings aim to enhance clinical care and advance solutions for the early diagnosis and prevention of newborn hyperbilirubinemia.

Materials and Methods

Study Design: This research was structured as a hospital-based prospective observational study to evaluate the etiological variables and preventative strategies for newborn jaundice among neonates hospitalized in the neonatal ward.

Study Area: The research was performed in the Department of Paediatrics at Sheikh Bhikhari Medical College Hospital, Hazaribagh, Jharkhand, India, for one year.

Study Population: The research cohort comprised infants admitted to the neonatal unit who exhibited clinical signs of neonatal jaundice during the study period.

Study Participants

a. **Inclusion Criteria**

- Neonates identified with newborn jaundice during the research duration
- Neonates admitted to the neonatal intensive care unit (NICU) or paediatric ward.
- Term and preterm newborns
- Neonates from 0 to 28 days of age
- Parents or guardians prepared to provide informed consent

b. **Exclusion Criteria**

- Neonates exhibiting significant congenital abnormalities
- Neonates experiencing significant birth trauma
- Neonates whose parents or guardians declined consent
- Neonates with deficient clinical or laboratory documentation

- Neonates released against medical counsel prior to the conclusion of the assessment

Sample Size: The study had a total sample size of 90 newborns diagnosed with neonatal jaundice.

Procedure: All infants hospitalized with jaundice during the study period were enrolled after parental consent. A detailed clinical history was obtained using a standardized pro forma that included demographic data, gestational age, birth weight, risk factors, and the onset of jaundice. Severity was assessed on physical examination. Laboratory studies were performed as needed, including serum bilirubin, CBC, blood grouping, and Coombs testing. We examined preventive strategies such as breastfeeding, prenatal care, and maternal awareness. Neonates received conventional care, including phototherapy or exchange transfusion. Clinical progress and outcomes were followed, and data were collected and rigorously validated prior to analysis.

Statistical Analysis: The gathered data were compiled, coded, and entered into Microsoft Excel, followed by analysis using the Statistical Package for the Social Sciences (SPSS) version 27.0. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize the demographic and clinical characteristics of the research participants. Relationships among etiological variables, preventative strategies, and the severity of newborn jaundice were evaluated using the Chi-square test and other relevant statistical analyses. A p-value below 0.05 was deemed statistically significant.

Result

Table 1 presents the socio-demographic and birth characteristics of the neonates. Of the 90 neonates, 53.3% were 4–7 days of age, 31.1% were ≤3 days of age, and 15.6% were >7 days of age. A male preponderance was observed, with 64.4% male and 35.6% female. The majority of neonates were term (66.7%), 28.9% were preterm, and 4.4% were post-term. Regarding birth weight, 73.3% had a normal birth weight (≥2.5 kg) and 26.7% were of low birth weight.

Table 1: Socio-Demographic and Birth Characteristics of Neonates with Jaundice (n=90)

Variable	Category	Frequency (n)	Percentage (%)
Age (Days)	≤ 3 days	28	31.1
	4–7 days	48	53.3
	> 7 days	14	15.6
Sex	Male	58	64.4
	Female	32	35.6
Gestational Age	Preterm (<37 weeks)	26	28.9
	Term (37–40 weeks)	60	66.7
	Post-term (>40 weeks)	4	4.4
Birth Weight	<2.5 kg (LBW)	24	26.7
	≥2.5 kg	66	73.3

The clinical profile of newborn jaundice in the study population is shown in Table 2. The most common onset of jaundice was within 1–3 days (37.8%), followed by 4–5 days (35.6%), with 8.9% within 24 hours and 17.8% after 5 days. The severity of jaundice was moderate in 37.8% of the patients, severe in 28.9%, mild in 17.8% and extremely severe in 15.6%. In terms of bilirubin levels, 35.6% of neonates had bilirubin levels of 5–10 mg/dL, 31.1% had bilirubin levels of 10–15 mg/dL, 22.2% had bilirubin levels greater than 15 mg/dL, and 11.1% had bilirubin levels less than 5 mg/dL.

Table 2: Clinical Profile of Neonatal Jaundice among Study Participants (n=90)

Variable	Category	Frequency (n)	Percentage (%)
Onset of Jaundice	<24 hours	8	8.9
	1–3 days	34	37.8
	4–5 days	32	35.6
	>5 days	16	17.8
Severity	Mild	16	17.8
	Moderate	34	37.8
	Severe	26	28.9
	Very severe	14	15.6
Bilirubin (mg/dL)	<5	10	11.1
	5–10	32	35.6
	10–15	28	31.1
	>15	20	22.2

Table 3 shows the causes of newborn jaundice. The commonest cause was septicemia (24.4%), followed by physiologic jaundice (20.0%) and birth asphyxia (15.6%). Prematurity accounted for 13.3%. Other reasons included Rh incompatibility (8.9 %), ABO incompatibility (6.7 %), IUGR (6.7 %) and UTI (4.4 %).

Table 3: Causes of Neonatal Jaundice among Study Participants (n=90)		
Cause	**Frequency (n)**	**Percentage (%)**
Physiological jaundice	18	20
Septicemia	22	24.4
Birth asphyxia	14	15.6
Prematurity	12	13.3
Rh incompatibility	8	8.9
ABO incompatibility	6	6.7
IUGR	6	6.7
UTI	4	4.4

Table 4 presents care and prevention methods of newborn jaundice. Moreover, more than half (57.8%) of the carers had acceptable preventative behaviors, whereas 42.2% had insufficient procedures. Phototherapy was the most common treatment modality (64.4%), followed by antibiotics (22.2%), while exchange transfusion and conservative control were used in 6.7% of patients each.

Table 4: Management and Preventive Practices Related to Neonatal Jaundice (n=90)			
Variable	**Category**	**Frequency (n)**	**Percentage (%)**
Preventive Practice	Adequate	52	57.8
	Inadequate	38	42.2
Treatment	Phototherapy	58	64.4
	Antibiotics	20	22.2
	Exchange transfusion	6	6.7
	Conservative management	6	6.7

Table 5 shows the complication status of infants with jaundice. 66.7% neonates suffered issues, whereas 33.3% did not develop any difficulties during the research time.

Table 5: Complication Status among Neonates with Jaundice (n=90)		
Status	**Frequency (n)**	**Percentage (%)**
Developed complications	60	66.7
No complications	30	33.3

Table 6 shows the relation between birth weight and the severity of jaundice. Severe to very severe jaundice was seen in 66.7% of low-birth-weight newborns as opposed to 36.4% of normal birth weight neonates. However, in newborns with normal birth weight, 63.6% had mild to moderate jaundice, whereas only 33.3% of low-birth-weight neonates had mild to severe jaundice.

Table 6: Association between Birth Weight and Severity of Neonatal Jaundice			
Birth Weight	**Mild–Moderate**	**Severe–Very Severe**	**Total**
LBW (n=24)	8 (33.3%)	16 (66.7%)	24
Normal (n=66)	42 (63.6%)	24 (36.4%)	66

Discussion

This hospital-based study assessed the causes, prevention strategies, and early consequences of newborn jaundice in 90 neonates admitted to a tertiary care facility. Neonatal jaundice is a common condition among newborns that significantly contributes to neonatal morbidity, especially in underdeveloped nations. The current data offer significant insights into demographic features, etiological factors, preventive measures, treatment options, and related problems in affected neonates.

The present study reveals that a majority of newborns (53.3%) were hospitalized between 4 and 7 days of life, suggesting that jaundice frequently occurs during the early neonatal period. Mitra and Rennie [1] reported similar findings, noting that blood bilirubin levels often peak between the third and fifth day of life in term infants. Ho NK [2] also noted that the majority of infants with physiological

jaundice manifest during the initial week of life. These data corroborate the notion that newborn hyperbilirubinemia is mostly an early neonatal occurrence.

The current investigation revealed a male preponderance, with 64.4% of the afflicted neonates being male. Ahmed and Talukder [3] made similar observations, noting a higher prevalence of newborn jaundice among male infants. Numerous Indian and global studies have also indicated a male preponderance, possibly attributable to genetic and hormonal factors that influence bilirubin metabolism.

In the current study, term newborns accounted for 66.7% of cases, whereas preterm neonates accounted for 28.9%. Melton and Akinbi [4] observed similar findings, indicating that while newborn jaundice is prevalent in term babies, preterm neonates have a heightened vulnerability to severe hyperbilirubinemia due to hepatic immaturity and diminished bilirubin conjugation capability. Singh [5] also highlighted preterm as a significant risk factor for bilirubin toxicity and neurological consequences.

The majority of neonates in this study displayed jaundice from 1 to 5 days of age; however, 8.9% exhibited jaundice during the first 24 hours. Early-onset jaundice is clinically significant since it often signifies pathological aetiologies such as haemolytic disease or sepsis. Singh [5] reported similar findings, indicating that jaundice appearing within the first 24 hours warrants thorough investigation for underlying causes.

In terms of severity, moderate jaundice was the most prevalent at 37.8%, followed by severe jaundice at 28.9%. Severe jaundice was observed in 15.6% of infants, indicating a substantial incidence of serious hyperbilirubinemia. Erdeve [6] documented similar findings in low- and middle-income nations, where delayed diagnosis and insufficient healthcare resources exacerbate severe infant jaundice. Mitra and Rennie [1] similarly observed that delayed intervention may increase the incidence of bilirubin encephalopathy and kernicterus.

The current study found septicemia to be the leading etiological cause (24.4%), followed by physiological jaundice (20%), birth asphyxia (15.6%), and preterm (13.3%). Ahmed and Talukder [3] also observed that newborn sepsis is a significant contributor to pathological jaundice. Septicemia induces jaundice through hemolysis, hepatic impairment, and impaired bilirubin elimination. Physiological jaundice remained a significant factor, consistent with Ho NK [2], who highlighted that immature hepatic enzyme systems cause temporary hyperbilirubinemia in healthy newborns.

Rh incompatibility (8.9%) and ABO incompatibility (6.7%) were significant etiological variables in the present investigation. Waters and Bowen [7] confirmed the same findings, indicating that hemolytic disorders continue to be substantial contributors to severe newborn hyperbilirubinemia and kernicterus. Hansen [8] emphasized the significance of Rh isoimmunization in severe newborn jaundice prior to the extensive implementation of anti-D prophylaxis.

An evaluation of preventive practices found that 57.8% of carers adhered to adequate preventive measures, whereas 42.2% exhibited insufficient behaviors. Erdeve [6] has similarly shown that insufficient maternal knowledge, delayed initiation of breastfeeding, and inadequate access to healthcare significantly contribute to severe infant jaundice in resource-constrained environments. Proper prenatal care and early initiation of breastfeeding are crucial for lowering bilirubin levels and preventing complications.

In the current study, phototherapy was the predominant treatment, used by 64.4% of participants. Mitra and Rennie [1] reported similar findings, identifying phototherapy as the standard and most efficacious treatment for unconjugated hyperbilirubinemia. Exchange transfusion was necessary in only 6.7% of infants, indicating that prompt detection and intervention averted progression to severe bilirubin encephalopathy in most cases.

Complications were observed in 66.7% of infants in this study, underscoring the considerable morbidity associated with neonatal jaundice. Moreover, low-birth-weight neonates had markedly higher rates of severe to very severe jaundice than normal-birth-weight neonates (66.7% vs. 36.4%, $p<0.05$). Melton and Akinbi [4] also reported that low birth weight and preterm birth are significant risk factors for severe hyperbilirubinemia due to immature hepatic function and heightened vulnerability to infection.

This study highlights that neonatal jaundice is a significant neonatal health issue that requires early diagnosis, identification of causative factors, implementation of preventive measures, and prompt intervention to mitigate morbidity and avert complications such as kernicterus and long-term neurological consequences.

Conclusion

Newborn jaundice is a common and clinically significant condition in the early newborn period, contributing substantially to infant morbidity, especially in tertiary care facilities in developing areas. This study emphasizes that although most cases occur in term neonates, preterm and low-birth-weight infants have a significantly elevated risk of severe hyperbilirubinemia and its related consequences due to physiological immaturity. Septicemia, birth asphyxia, and preterm birth were identified as the primary etiological factors, suggesting that a significant number of cases might be avoided through

enhanced prenatal, perinatal, and postnatal care. Although physiological jaundice constituted a significant proportion, the presence of pathogenic causes underscores the imperative for meticulous assessment of each jaundiced infant. Phototherapy has become the predominant and most efficacious treatment modality, with a minimal percentage necessitating exchange transfusion; nevertheless, the incidence of treatment-related complications in a considerable number of cases highlights the necessity for ongoing monitoring and supportive care. This study highlights deficiencies in preventive measures and inadequate awareness among carers, underscoring the necessity of enhancing health education, advocating for the early initiation and adequacy of breastfeeding, and maintaining consistent prenatal follow-up and hospital births. Early identification of risk factors, timely diagnosis, and prompt evidence-based management, along with enhanced preventive strategies and healthcare accessibility, are essential for alleviating the burden, minimizing complications, and improving overall neonatal outcomes related to hyperbilirubinemia.

References

1. Hansen TW. Pioneers in the scientific study of neonatal jaundice and kernicterus. Pediatrics. 2000 Aug 1;106(2):e15-.
2. Melton K, Akinbi HT. Neonatal jaundice: strategies to reduce bilirubin-induced complications. Postgraduate medicine. 1999 Jan 1;106(6):167-78.
3. Singh M. Care of the new born 6 th edition: Narinder K Sagar for Sagar publication. New Delhi. 2004 Aug.
4. Ahmed S, Talukder MQ. Hyperbilirubinemia in the newborn. Bang J Child Health. 1983; 6:17-21.
5. Waters WJ, Bowen WR. Bilirubin encephalopathy-studies related to cellular respiration. In-ama American journal of diseases of children 1955 Jan 1 (Vol. 90, No. 5, pp. 603-603). 515 N STATE ST, CHICAGO, IL 60610: AMER MEDICAL ASSOC.
6. Erdeve O. Management of neonatal jaundice in low-income and middle-income countries. BMJ paediatrics open. 2020 Nov 2;4(1):e000845.
7. Mitra S, Rennie J. Neonatal jaundice: aetiology, diagnosis and treatment. British Journal of Hospital Medicine. 2017 Dec 2;78(12):699-704.
8. Ho NK. Neonatal jaundice in Asia. Baillière's clinical haematology. 1992 Jan 1;5(1):131-42.