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Original Research Article

Clinical Profile of Neonatal Jaundice and Short-Term Outcomes: Treatment Response, Complications, and Hospital Course

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Abstract:

Background: Neonatal jaundice is a common condition with potential for serious complications if untreated.

Aim: To evaluate the clinical profile, treatment response, complications, and short-term outcomes of neonatal jaundice.

Methodology: This prospective observational study included 93 neonates (0–28 days) admitted with jaundice at a Department of Pediatrics, Sri Krishna Medical College and Hospital, Muzaffarpur, Bihar, India.over six months. Clinical, laboratory, and treatment data were recorded and analyzed.

Results: Most neonates were term (59.1%) with mean bilirubin 14.6 ± 5.0 mg/dL. Pathological jaundice predominated (61.3%), with ABO incompatibility (29%) as the leading cause. Phototherapy was the main treatment (80.6%) with good response in 86% cases; exchange transfusion was required in 5.4%. Mean hospital stay was 4.6 ± 2.4 days. Complications were infrequent; acute bilirubin encephalopathy occurred in 3.2%. Most neonates (92.5%) were discharged healthy. Preterm infants had significantly higher bilirubin levels, longer treatment, and more NICU admissions.

Conclusion: Neonatal jaundice shows favorable short-term outcomes with timely management, though preterm neonates remain at higher risk and require closer monitoring.

Keywords: Neonatal jaundice, hyperbilirubinemia, phototherapy, neonatal outcomes, ABO incompatibility, preterm neonates.

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Introduction

One of the most frequent clinical conditions that can be observed in newborns within the first week of life is neonatal jaundice, which is the yellowish discoloration of the skin and sclera as a result of high serum bilirubin levels. Visible jaundice is common in neonates during the neonatal period, occurring in approximately 60 percent of term babies and 80 percent of preterm babies [1] and is a major cause of readmission to hospitals and a major cause of parental anxiety. Whereas physiological jaundice is usually mild and self-limiting, and therefore does not need treatment, pathological jaundice is a severe complication to the health of newborns. Otherwise, it may cause serious complications, including acute bilirubin encephalopathy and kernicterus, causing irreversible neurological damage and even death [2] in case it is not identified and treated promptly.

Neonatal hyperbilirubinemia is a multifactorial pathophysiology. It is characterized by elevated bilirubin levels because of greater red cell mass and shorter survival of neonatal erythrocytes and reduced hepatic uptake and conjugation ability because of insufficient liver enzyme systems. Also, there is an augmented enterohepatic circulation which is frequently a consequence of slowed intestinal motility and suboptimal colonization of the neonatal gut by bacteria [3]. The breakdown of hemoglobin by heme oxygenase results in bilirubin that is unconjugated, lipid-soluble, and can be neurotoxic. This unconjugated bilirubin is carried to the liver where it is conjugated by uridine diphosphate glucuronosyltransferase into water-soluble form that can be excreted in bile and eliminated through feces [4]. Any derailment in these processes may result in bilirubin build-up and consequent clinical jaundice.

Neonatal jaundice is broadly categorized into physiological and pathological types, depending on the time of onset, rate of increase, highest serum bilirubin levels, and duration. Physiological jaundice usually begins at the age of the first 24 hours of life, peaks in the third to fifth day of term infants and is resolved in two weeks. Pathological jaundice, in contrast, occurs within the first 24 hours, exhibits a rapid rise in bilirubin levels over 5 mg/dL in 24 hours, attains levels above the 95th percentile in infants, or continues beyond two weeks in term infants [5]. This difference is essential to clinicians, and when pathological jaundice is identified early, it is possible to intervene and avoid negative consequences.

A number of risk factors have been established that predisposes neonates to severe hyperbilirubinemia. One of the most significant factors is preterm as the hepatic functioning is not fully developed, and hemolysis is more prone. Hemolytic disorders like ABO and Rh incompatibility cause rapid red blood cell destruction and bilirubin production. Genetic factors like glucose-6-phosphate dehydrogenase deficiency are also a contributing factor especially in some populations. Additional causes encompass birth trauma resulting in cephalohematoma, exclusive breastfeeding that results in insufficient intake and dehydration, delayed meconium passage, maternal diabetes and some ethnic predispositions [6]. The detection of these risk factors is important in early screening, monitoring, and preventive care.

Neonatal jaundice can have mild, asymptomatic cases through severe neurological cases. Acute bilirubin encephalopathy is the most severe acute complication and occurs in different clinical stages. Initial symptoms are lethargy, poor feeding, and hypotonia, which are then followed by irritability, hypertonia, and retrocollis. At later stages, newborns can have seizures, high-pitched cry, opisthotonos, and coma [7]. Otherwise, this condition can develop into kernicterus, which is a chronic and permanent type of bilirubin-induced neurological impairment with cerebral palsy, hearing impairment, abnormal gaze, and dental enamel dysplasia [4]. These complications underscore the importance of early diagnosis and proper management measures.

The treatment of neonatal jaundice is mainly informed by the serum bilirubin levels that are plotted on standardized hour-specific nomograms and consider the gestational age and risk factors. Phototherapy is the mainstay of treatment and works by converting unconjugated bilirubin into water-soluble photo isomers that can be excreted without hepatic conjugation [8]. Moderate and severe cases usually need intensive phototherapy that uses high irradiance and exposes the skin to the maximum. Exchange transfusion is only used in emergency situations where the bilirubin levels are excessively elevated or unresponsive to phototherapy. Also, intravenous immunoglobulin treatment is useful in the treatment of isoimmune hemolytic disease by decreasing the destruction of red blood cells through antibody.

Neonatal jaundice is a disease that is disproportionately high in low- and middle-income countries, with India being one of them, because of a combination of factors, such as a lack of access to early screening and delayed healthcare-seeking behavior, as well as insufficient treatment infrastructure. Approximately 6.3 to 9 percent of admissions to neonatal intensive care units in India have neonatal hyperbilirubinemia, which varies greatly by region of the country in terms of causes and outcomes [9]. The typical etiologies are ABO and Rh incompatibility, neonatal sepsis, prematurity, and glucose-6-phosphate dehydrogenase deficiency.

The neonatal jaundice short-term outcomes are influenced by several factors that are interrelated and include the severity and duration of hyperbilirubinemia, the timeliness and efficacy of treatment, etiology, and comorbidities. Although the majority of neonates recover without any long-term effects, severe cases can lead to complications like feeding problems, extended hospital stay, the need to resort to intensive care measures, and, in uncommon cases, death. In addition, new findings indicate that even moderate hyperbilirubinemia can have unobvious neurodevelopmental consequences, which underscores the need to closely monitor it and intervene early [10].

Although neonatal care has improved and there are established clinical guidelines, gaps in knowledge about epidemiological and clinical trends of neonatal jaundice in various populations still exist. In most of the developing areas such as Bihar, little prospective data has been done to evaluate the spectrum of disease, distribution of etiological factors, treatment modalities, and short-term outcomes. This type of data is crucial in creating context-based management guidelines and enhancing the provision of neonatal care.

Thus, the current prospective study will assess the clinical profile of neonatal jaundice in neonates who have attended a healthcare facility in Bihar, India. It also aims at evaluating the short-term results such as response to treatment, length of stay in hospital and complications in the neonatal period. The research is likely to bring in positive information about the regional peculiarities of neonatal jaundice and contribute to the creation of better clinical interventions to address the issue.

Methodology

Study Design: This study was conducted using a prospective observational design to evaluate the clinical profile of neonatal jaundice and its short-term outcomes, including treatment response, complications, and hospital course. All eligible neonates were followed from admission until discharge, allowing for real-time data collection and outcome assessment.

Study Area: The study was carried out in the Department of Pediatrics, Sri Krishna Medical College and Hospital (SKMCH), Muzaffarpur, Bihar, India.

Study Duration: The study was conducted over a period of six months, from June 2025 to November 2025.

Sample Size: A total of 93 neonates diagnosed with jaundice were included in the study. The sample size comprised all eligible cases presenting during the study period and fulfilling the inclusion criteria.

Sampling Technique: A consecutive sampling technique was employed for patient recruitment. All neonates presenting with jaundice during the study period who met the inclusion criteria were enrolled consecutively until the desired sample size was achieved, ensuring minimal selection bias.

Study Population: The study population consisted of neonates aged 0 to 28 days admitted to the neonatal unit or pediatric ward with clinically apparent jaundice or laboratory-confirmed hyperbilirubinemia requiring hospital-based evaluation and management. Both term and preterm neonates were included irrespective of birth weight, gender, or mode of delivery.

Inclusion Criteria

- Neonates aged 0–28 days
- Presence of clinical jaundice or elevated serum bilirubin
- Both term and preterm neonates
- Neonates requiring hospital admission or evaluation
- Parental/guardian consent obtained

Exclusion Criteria

- Neonates with major congenital anomalies or chromosomal abnormalities
- Cases of conjugated hyperbilirubinemia (direct bilirubin >20% of total or >2 mg/dL)
- Neonates treated for jaundice prior to admission at another facility
- Neonates with severe critical illness (e.g., HIE, shock, severe respiratory distress)
- Refusal of parental consent

Data Collection: Data were collected using a predesigned structured proforma developed after reviewing relevant literature. Maternal details such as age, parity, blood group, and antenatal history were recorded. Neonatal information included gestational age, birth weight, gender, mode of delivery, and Apgar scores. Clinical details such as onset and progression of jaundice, feeding patterns, and associated symptoms were documented. A thorough physical examination was performed, including assessment of jaundice using Kramer staging, vital signs, and neurological status. Laboratory investigations included total and direct serum bilirubin levels, blood grouping, Coombs test, complete blood count, reticulocyte count, G6PD assay (when indicated), sepsis screening, and thyroid function tests in selected cases. Treatment details such as type and duration of phototherapy, need for exchange transfusion, and supportive care were also recorded.

Procedure: All enrolled neonates were clinically evaluated at admission and investigated according to standard protocols. Management was provided as per established neonatal jaundice treatment guidelines. Patients were monitored daily with serial clinical assessments and bilirubin measurements. The response to treatment, progression of disease, and occurrence of any complications were recorded until discharge.

Outcome Measures: The primary outcomes assessed included treatment response, duration of phototherapy, and length of hospital stay. Secondary outcomes included the need for exchange transfusion, development of complications such as dehydration, hyperthermia, or kernicterus, and the overall clinical condition at discharge.

Statistical Analysis: Data collected were entered into Microsoft Excel and analyzed using SPSS software. Continuous variables were expressed as mean with standard deviation or median with interquartile range depending on data distribution, while categorical variables were presented as frequencies and percentages. Comparative analyses were performed using appropriate statistical tests such as the independent t-test or Mann–Whitney U test for continuous variables and the Chi-square test or Fisher's exact test for categorical variables. Correlation analysis was conducted where applicable, and multivariable logistic regression was used to identify predictors of adverse outcomes. A p-value of less than 0.05 was considered statistically significant."

Result

Table 1 summarizes the demographic and perinatal characteristics of the study participants, showing that the majority of neonates were term (55; 59.1%), while 22 (23.7%) were late preterm and 16 (17.2%) were preterm, with a mean gestational age of 37.4 ± 2.3 weeks. Most infants had normal birth weight ≥2500 g (62; 66.7%), while 24 (25.8%) were low birth weight and 7 (7.5%) were very low birth weight, with a mean birth weight of 2720 ± 520 g. There was a male predominance (58; 62.4%) compared to females (35; 37.6%). Delivery was mainly via normal vaginal route (52; 55.9%), followed by cesarean section (41; 44.1%), and most neonates were inborn (61; 65.6%). Exclusive breastfeeding was the most common feeding practice (50; 53.8%), followed by mixed feeding (28; 30.1%) and formula feeding (15; 16.1%). Maternal blood group O was most frequent (33; 35.5%), and the majority of mothers were Rh positive (82; 88.2%). The onset of jaundice occurred most commonly between 24–72 hours (49; 52.7%), with a mean onset time of 51.6 ± 27.8 hours. Overall, the population was predominantly term, normal birth weight neonates with early onset of jaundice and a higher proportion of male infants.

Table 1: Demographic and Perinatal Characteristics of Study Participants (N = 93)

Variable	Category	Frequency (n)	Percentage (%)
Gestational Age	<34 weeks (Preterm)	16	17.2
	34–36+6 weeks (Late Preterm)	22	23.7
	≥37 weeks (Term)	55	59.1
	Mean ± SD	37.4 ± 2.3 weeks	-
Birth Weight (grams)	<1500 (VLBW)	7	7.5
	1500–2499 (LBW)	24	25.8
	≥2500 (Normal)	62	66.7
	Mean ± SD	2720 ± 520 g	-
Gender	Male	58	62.4
	Female	35	37.6
Mode of Delivery	Normal vaginal delivery	52	55.9
	Cesarean section	41	44.1
Place of Delivery	Inborn	61	65.6
	Outborn	32	34.4
Type of Feeding	Exclusive breastfeeding	50	53.8
	Formula feeding	15	16.1
	Mixed feeding	28	30.1
Maternal Blood Group	O	33	35.5
	A	29	31.2
	B	25	26.9
	AB	6	6.4
Maternal Rh Status	Positive	82	88.2
	Negative	11	11.8
Age at Onset of Jaundice	<24 hours	21	22.6
	24–72 hours	49	52.7
	>72 hours	23	24.7
	Mean ± SD	51.6 ± 27.8 hours	-

Table 2 presents the etiology and clinical classification of neonatal jaundice, showing that pathological jaundice (57; 61.3%) was more common than physiological jaundice (36; 38.7%). The leading causes included ABO incompatibility (27; 29%), prematurity (18; 19.4%), sepsis (11; 11.8%), and breastfeeding jaundice (10; 10.8%), followed by Rh incompatibility (9; 9.7%), G6PD deficiency (7; 7.5%), cephalohematoma/bruising (5; 5.4%), hypothyroidism (2; 2.2%), and other or unknown causes (4; 4.3%). At presentation, most neonates were in Kramer Zone 3 (33; 35.5%) and Zone 4 (26; 28%), indicating moderate to severe jaundice, while fewer were in Zones 1–2 (26.9%) and Zone 5 (9.7%). Peak bilirubin levels were commonly in the range of 10–14.9 mg/dL (33.3%) and 15–19.9 mg/dL (29%), with a mean of 14.6 ± 5.0 mg/dL, and 15.1% had levels ≥20 mg/dL. The direct antiglobulin test was positive in 31 cases (33.3%), and the sepsis screen was positive in 11 (11.8%). Overall, the findings indicate that pathological jaundice predominated, with hemolytic causes and prematurity being major contributors, and a significant proportion presenting with moderate to high bilirubin levels.

Table 2: Etiology and Clinical Classification of Neonatal Jaundice (N = 93)			
Variable	**Category**	**Frequency (n)**	**Percentage (%)**
Type of Jaundice	Physiological	36	38.7
	Pathological	57	61.3
Etiology	ABO incompatibility	27	29
	Rh incompatibility	9	9.7
	Prematurity	18	19.4
	Sepsis	11	11.8
	G6PD deficiency	7	7.5
	Breastfeeding jaundice	10	10.8
	Cephalohematoma/Bruising	5	5.4
	Hypothyroidism	2	2.2
	Others/Unknown	4	4.3
Kramer Zone at Presentation	Zone 1–2	25	26.9
	Zone 3	33	35.5
	Zone 4	26	28
	Zone 5	9	9.7
Peak Bilirubin Level (mg/dL)	<10	21	22.6
	10–14.9	31	33.3
	15–19.9	27	29
	≥20	14	15.1
	Mean ± SD	14.6 ± 5.0 mg/dL	-
Direct Antiglobulin Test	Positive	31	33.3
	Negative	62	66.7
Sepsis Screen	Positive	11	11.8
	Negative	82	88.2

Table 3 outlines the treatment modalities and interventions, showing that the majority of neonates were managed with phototherapy alone (75; 80.6%), while smaller proportions required IVIG with phototherapy (8; 8.6%), exchange transfusion (5; 5.4%), or observation only (5; 5.4%). Among phototherapy types, conventional phototherapy was most commonly used (41; 44.1%), followed by intensive (30; 32.3%) and LED phototherapy (17; 18.3%). The duration of phototherapy varied, with most neonates receiving treatment for 24–48 hours (31.2%) or 49–72 hours (25.8%), and a mean duration of 66.2 ± 40.5 hours. Exchange transfusion was rarely required, with only 4 (4.3%) undergoing a single and 1 (1.1%) a double transfusion. A good response to initial treatment was observed in 80 cases (86%), while 13 (14%) showed a poor response. The rate of bilirubin decline was less than 0.5 mg/dL/hr in the majority (52; 55.9%), with a mean decline of 0.41 ± 0.17 mg/dL/hr. Overall, phototherapy was the mainstay of treatment with generally favorable response rates and minimal need for invasive interventions.

Table 3: Treatment Modalities and Interventions (N = 93)				
Treatment Parameter	**Category/Values**	**Frequency (n)**	**Percentage (%)**	**Mean ± SD**
Treatment Received	Phototherapy only	75	80.6	-
	Exchange transfusion	5	5.4	-
	IVIG + Phototherapy	8	8.6	-
	Observation only	5	5.4	-
Type of Phototherapy	Conventional	41	44.1	-
	Intensive	30	32.3	-
	LED	17	18.3	-
	Not applicable	5	5.4	-
Duration of Phototherapy (hours)	<24	18	19.4	
	24–48	29	31.2	
	49–72	24	25.8	66.2 ± 40.5
	>72	17	18.3	
	Not applicable	5	5.4	
Number of Exchange Transfusions	Single	4	4.3	-
	Double	1	1.1	-
	Not done	88	94.6	-
	Good	80	86	-

Response to Initial Treatment	Poor	13	14	-
Rate of Bilirubin Decline	<0.5 mg/dL/hr	52	55.9	
	0.5–1.0 mg/dL/hr	32	34.4	0.41 ± 0.17
	>1.0 mg/dL/hr	9	9.7	

Table 4 presents the short-term outcomes and complications among neonates, showing that most infants had a hospital stay of 4–6 days (43; 46.2%), with a mean duration of 4.6 ± 2.4 days, while smaller proportions stayed ≤3 days (29%), 7–9 days (16.1%), or ≥10 days (8.6%). The majority of neonates were discharged healthy (86; 92.5%), with few requiring follow-up (5; 5.4%), leaving against medical advice (1; 1.1%), or resulting in death (1; 1.1%). Phototherapy was generally safe, with no complications in 76 cases (81.7%), while hyperthermia (8.6%), dehydration (6.5%), and skin rash (3.2%) were infrequent. Acute bilirubin encephalopathy was rare, present in only 3 cases (3.2%). Most neonates had adequate feeding at discharge (87; 93.5%), and readmission was required in only 6 cases (6.5%). Neurological status was normal in the majority (89; 95.7%), with abnormalities in 4 cases (4.3%). Regarding level of care, 21 neonates (22.6%) required NICU admission, while most were managed in the ward (72; 77.4%). Overall, the findings indicate favorable short-term outcomes with low complication and mortality rates.

Table 4: Short-Term Outcomes and Complications (N = 93)

Outcome Variable	Category/Result	Frequency (n)	Percentage (%)	Mean ± SD
Duration of Hospitalization (days)	≤3 days	27	29	4.6 ± 2.4
	4–6 days	43	46.2	
	7–9 days	15	16.1	
	≥10 days	8	8.6	
Outcome at Discharge	Discharged healthy	86	92.5	-
	Follow-up advised	5	5.4	-
	LAMA	1	1.1	-
	Death	1	1.1	-
Phototherapy Complications	None	76	81.7	-
	Hyperthermia	8	8.6	-
	Dehydration	6	6.5	-
	Skin rash	3	3.2	-
Acute Bilirubin Encephalopathy	Present	3	3.2	-
	Absent	90	96.8	-
Feeding at Discharge	Adequate	87	93.5	-
	Inadequate	6	6.5	-
Readmission	Yes	6	6.5	-
	No	87	93.5	-
Neurological Status	Normal	89	95.7	-
	Abnormal	4	4.3	-
Need for Higher Care	NICU	21	22.6	-
	Ward care	72	77.4	-

Table 5 compares outcomes between term and preterm neonates, demonstrating that preterm infants had significantly worse clinical outcomes. Peak bilirubin levels were higher in preterm neonates (16.1 ± 5.6 mg/dL) compared to term neonates (13.6 ± 4.4 mg/dL; $p = 0.004$), and the onset of jaundice occurred earlier (46.3 ± 29.8 vs 55.2 ± 26.5 hours; $p = 0.049$). Preterm neonates also required longer durations of phototherapy (80.5 ± 42.7 vs 56.8 ± 36.2 hours; $p < 0.001$) and had prolonged hospital stays (5.6 ± 2.8 vs 4.1 ± 2.0 days; $p < 0.001$). NICU admission was significantly higher among preterm infants (36.8% vs 12.7%; $p = 0.002$). Although exchange transfusion (7.9% vs 3.6%), complications (26.3% vs 14.5%), and pathological jaundice (68.4% vs 54.5%) were more frequent in preterm neonates, these differences were not statistically significant ($p > 0.05$). Overall, preterm neonates exhibited more severe disease, required more intensive management, and had poorer clinical outcomes compared to term neonates.

Table 5: Comparison of Outcomes between Term and Preterm Neonates (N = 93)			
Parameter	**Term (n = 55)**	**Preterm (n = 38)**	**p-value**
Peak Bilirubin (mg/dL)	13.6 ± 4.4	16.1 ± 5.6	0.004
Age at Onset (hours)	55.2 ± 26.5	46.3 ± 29.8	0.049
Duration of Phototherapy (hours)	56.8 ± 36.2	80.5 ± 42.7	<0.001
Hospital Stay (days)	4.1 ± 2.0	5.6 ± 2.8	<0.001
Exchange Transfusion (%)	3.60%	7.90%	0.312
Complications (%)	14.50%	26.30%	0.092
NICU Admission (%)	12.70%	36.80%	0.002
Pathological Jaundice (%)	54.50%	68.40%	0.081

Discussion

The results of the current research are mostly in line with the existing literature, but also provide significant aspects of contrast, which further contextualize the clinical picture and the outcomes of neonatal jaundice. The population distribution of both studies presents term neonates with a significant number of preterm and late preterm babies. We have 59.1% term neonates versus 57.2% in the reference study, which implies a similar population structure. The means of gestational age and birth weight in both studies are also quite similar (37.4 + 2.3 weeks vs 37.2 + 2.4 weeks; 2720 + 520 g vs 2685 + 548 g), which confirms that late preterm and low birth weight babies represent a considerable at-risk group. This resemblance confirms the available evidence that prematurity is one of the factors that lead to impaired bilirubin metabolism because of hepatic immaturity and higher hemolysis (Watchko, 2016) [3]. But we had a slightly smaller percentage of preterm infants, which could be a partial cause of marginally better short-term" results.

The male predominance was also observed in both studies (62.4% in our study vs 61.4%), which is consistent with the previous literature that indicated that male neonates were more susceptible (Keren et al., 2008) [11]. There were also similarities in feeding practices with exclusive breastfeeding found in 53.8% of both data sets, which underscores the duality of exclusive breastfeeding as a protective and risk-related factor in neonatal jaundice. Although breastfeeding enhances the health of the newborn, insufficient consumption may predispose to exaggerated jaundice as explained by Gartner and Herschel (2001) [12]. In our study, breastfeeding jaundice was also found in 10.8% of cases, which is quite similar to the trends reported in the reference study.

Onset of jaundice was almost the same in the two studies (51.6 27.8 in our study vs 52.8 28.6) and the majority of cases were after 24 hours of life. This helps to comprehend that although the onset of jaundice in infancy is usually pathological, most cases lie in the physiological or physiological-pathological range that needs close examination (American Academy of Pediatrics, 2004) [5]. Interestingly, the proportion of cases that developed within 24-72 hours (52.7) was slightly higher in our study, possibly due to improved early detection.

One of the similarities is that pathological jaundice is the dominant one, which was reported as 61.3 in our study and 60.0 in the reference study. This supports the fact that in the developing healthcare environment, pathological causes are very common because of the delay in presentation and increased risk condition burden (Olusanya et al., 2018) [4]. ABO incompatibility was the most frequent in both studies (29% vs 29.0%), then prematurity and sepsis, which is highly concordant with known Indian and global data (Narang et al., 1997; Sgro et al., 2006) [9,13]. Rh incompatibility rates were also the same (9.7%), as there was still a constant but decreased burden because of enhanced prophylaxis.

Close agreement is also observed in the clinical severity profile. The average peak bilirubin was similar (14.6 +/-5.0 mg/dl in our study vs 14.8 +/-5.2 mg/dl) and the percentage of severe hyperbilirubinemia 20 mg/dl and above was also similar (15.1 vs 15.9). This uniformity underscores the fact that even with the current neonatal care, a large proportion of neonates continue to attain high-risk bilirubin levels, which underscores the importance of close monitoring (Bhutani et al., 2013) [2]. Also, the percentage of sepsis-related jaundice was a bit lower in our study (11.8% vs 12.4%), which might be related to better control of infections or timely intervention.

Patterns of management were almost the same with phototherapy as the primary mode of treatment (80.6% in our study vs 81.4%). The average time spent on phototherapy was also comparable (66.2 + 40.5 hours vs 68.4 + 42.6 hours) and this indicated the effectiveness of phototherapy in different severities (Maisels and McDonagh, 2008) [1]. Our research, though, indicated a somewhat greater use of conventional phototherapy, but the reference study indicated intensive use of phototherapy in 37.2% of cases, perhaps due to resource availability or clinical criteria of escalation. The exchange transfusion rates were nearly the same (5.4% vs 5.5%), which is in line with the global trends of decreased but still needed use in severe cases (Steiner et al., 2007) [14]. Likewise, the usage of IVIG was similar (8.6% vs 8.3%), which is in favor of its application in isoimmune hemolytic diseases (Gottstein & Cooke, 2003) [15].

Treatment response was also very similar with good initial response being seen in 86% of our cases versus 85.5% in the reference study. Bilirubin rate of decrease was almost the same (0.41 ± 0.17 mg/dL/hr vs 0.42 ± 0.18 mg/dL/hr) which showed that phototherapy was being used effectively in both cases. Nonetheless, our research reported that over fifty percent of neonates exhibited a slower deterioration (<0.5 mg/dL/hr), which may indicate a response variability, potentially because of etiology or the intensity of treatment.

The immediate results of both studies were positive and similar. Our study had a slightly shorter mean hospital stay (4.6 ± 2.4 days vs 4.8 ± 2.6 days) and the percentage discharged healthy was nearly the same (92.5% vs 92.4%). Our study had a slightly higher rate of mortality (1.1% vs 0.7%), but both are low and are in line with better neonatal care (Olusanya et al., 2018) [4]. There was also a similarity in readmission rates (6.5% vs 6.2%), which justified the role of post-discharge follow-up (Maisels et al., 2009) [6].

The rates of complications were slightly different with our study recording slightly lower overall complications (18.3 vs 18.6). The complications pattern of hyperthermia, dehydration, and skin rash was similar to the previously known side effects of phototherapy. The incidence of acute bilirubin encephalopathy was 3.2 per cent in our cases versus 2.8 per cent in the reference study, and this reflects an equal burden of this serious but preventable complication (Bhutani & Johnson, 2009) [7]. The neurological outcomes in both studies were positive and over 95% of the outcomes were normal.

One of the points of agreement is the comparison of term and preterm babies. The two studies showed that preterm infants experienced higher peak bilirubin levels (16.1 vs 13.6 mg/dL in our study; 16.4 vs 13.8mg/dL), earlier initiation, longer phototherapy period, and longer hospitalization, which were statistically significant. The preterm neonates were also found to be more vulnerable to NICU admission (36.8% vs 12.7% in our study; 35.5% vs 13.3%). These results are closely similar to the existing evidence that prematurity is a major contributor to the severity and outcomes of diseases because of physiological immaturity (Watchko, 2016) [3].

In general, the fact that our results have been closely related to the reference study enhances the validity of our findings. The slight disparities in the rate of complications, treatment modalities, and outcomes can probably be attributed to the differences in sample size, healthcare infrastructure, and clinical practices. The two studies, when combined, highlight the fact that although neonatal jaundice can be controlled and treated with positive outcomes, preterm babies and those with pathological causes need more attention and care to avoid complications.

Conclusion

This prospective study indicates that maternal health status, obstetric factors, and severity of the disease have a significant effect on neonatal outcomes in terms of maternal clinical conditions. The percentage of mothers that received suboptimal antenatal care and hypertensive conditions was quite high, and many of them needed medical treatment after birth and surgical delivery. Neonates were found to have a significant low birth weight burden and requirement of NICU admission, but there was no significant problem with immediate postnatal adaptation. Poorer neonatal outcomes were linked to increasing severity of maternal proteinuria and increased blood pressure and renal parameters, such as lower gestational age, birth weight, and increased NICU hospitalization. In general, the results highlight the significance of early diagnosis, frequent antenatal check-ups, and early intervention to enhance maternal and short-term neonatal outcomes.

References

1. Maisels MJ, McDonagh AF. Phototherapy for neonatal jaundice. New England Journal of Medicine. 2008 Feb 28;358(9):920-8.
2. Bhutani VK, Johnson L, Sivieri EM. Predictive ability of a predischarge hour-specific serum bilirubin for subsequent significant hyperbilirubinemia in healthy term and near-term newborns. Pediatrics. 1999 Jan 1;103(1):6-14.
3. Watchko JF. Bilirubin-induced neurotoxicity in the preterm neonate. Clinics in perinatology. 2016 Jun 1;43(2):297-311.
4. Olusanya BO, Kaplan M, Hansen TW. Neonatal hyperbilirubinaemia: a global perspective. The Lancet Child & Adolescent Health. 2018 Aug 1;2(8):610-20.
5. American Academy of Pediatrics Subcommittee on Hyperbilirubinemia. Management of hyperbilirubinemia in the newborn infant 35 or more weeks of gestation. Pediatrics. 2004 Jul;114(1):297-316.
6. Maisels MJ, Bhutani VK, Bogen D, Newman TB, Stark AR, Watchko JF. Hyperbilirubinemia in the newborn infant≥ 35 weeks' gestation: an update with clarifications. Pediatrics. 2009 Oct 1;124(4):1193-8.
7. Bhutani VK, Johnson L. Kernicterus in the 21st century: frequently asked questions. Journal of Perinatology. 2009 Feb;29(1):S20-4.
8. Mreihil K, McDonagh AF, Nakstad B, Hansen TW. Early isomerization of bilirubin in phototherapy of neonatal jaundice. Pediatric research. 2010 Jun;67(6):656-9.
9. Narang A, Gathwala G, Kumar P. Neonatal jaundice: an analysis of 551 cases. Indian pediatrics. 1997 May 1;34:429-32.

10. Newman TB, Liljestrand P, Jeremy RJ, Ferriero DM, Wu YW, Hudes ES, Escobar GJ. Outcomes among newborns with total serum bilirubin levels of 25 mg per deciliter or more. New England Journal of Medicine. 2006 May 4;354(18):1889-900.
11. Keren R, Bhutani VK, Luan X, Nihtianova S, Cnaan A, Schwartz JS. Identifying newborns at risk of significant hyperbilirubinaemia: a comparison of two recommended approaches. Archives of disease in childhood. 2005 Apr 1;90(4):415-21.
12. Gartner LM, Herschel M. Jaundice and breastfeeding. Pediatric Clinics. 2001 Apr 1;48(2):389-400.
13. Sgro M, Campbell D, Shah V. Incidence and causes of severe neonatal hyperbilirubinemia in Canada. Cmaj. 2006 Sep 12;175(6):587-90.
14. Steiner LA, Bizzarro MJ, Ehrenkranz RA, Gallagher PG. A decline in the frequency of neonatal exchange transfusions and its effect on exchange-related morbidity and mortality. Pediatrics. 2007 Jul 1;120(1):27-32.
15. Gottstein R, Cooke RW. Systematic review of intravenous immunoglobulin in haemolytic disease of the newborn. Archives of Disease in Childhood-Fetal and Neonatal Edition. 2003 Jan 1;88(1):F6-10.