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Neonatal Jaundice Cases Attending at a Selected Tertiary Level Hospital in Dhaka, Bangladesh

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Abstract

Neonatal jaundice, a prevalent condition among newborns, affects up to 60% of term and 80% of preterm infants globally. It poses a significant health risk, especially in low-resource settings like Bangladesh, due to its potential progression to severe neurological complications such as kernicterus. This study aimed to evaluate the clinical types, risk factors, and socio-demographic determinants of neonatal jaundice at a tertiary hospital in Dhaka. A descriptive cross-sectional study was conducted at the Combined Military Hospital, Dhaka Cantonment, involving 101 neonates (0–28 days old) admitted with jaundice. Data were collected via structured questionnaires and hospital records, using purposive sampling. Variables assessed included neonatal age, sex, gestational age, mode of delivery, feeding patterns, maternal medication history, and Rh compatibility. Data were analyzed using SPSS version 20.0, with both descriptive and inferential statistics applied. Among 101 respondents, most were young (47.5%) Muslim (85.1%) housewives (67.3%) with HSC-level education (40.6%) and modest income (46.5%). Most lived in buildings (64.4%). Neonatal jaundice appeared early (within 2 days) in 55.4% of cases, affected more males (66.3%), and was linked to Rh incompatibility (83.2% of neonates were Rh-negative vs. 83.2% of mothers' Rh-positive), birth trauma (29.7%), and Caesarean delivery (59.4%). Nearly half had pathological jaundice, often with sepsis (39.6%) or congenital anomalies (19.8%). Maternal age ($p<0.01$), early onset ($p=.04$), birth weight ($p=.00$), and morbidity status ($p=0.02$) were significantly associated with jaundice type. Neonatal jaundice remains a significant cause of morbidity in Dhaka. The findings emphasize the need for early screening, especially for Rh incompatibility and sepsis. Strengthening institutional delivery practices and parental education can aid in timely diagnosis and intervention, reducing preventable complications.

Keywords:

Neonatal Jaundice, Hyperbilirubinemia, Risk Factors, Pathological Jaundice, Tertiary Care Hospital.

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Introduction:

Neonatal jaundice, derived from the French word "jaune" meaning yellow [1] , is one of the most common clinical conditions affecting newborns, characterized by yellowish discoloration of the skin, sclera, and mucous membranes due to elevated bilirubin levels. Modern medicine defines jaundice as a condition resulting from impaired bile production, liver dysfunction, or excessive hemolysis [2]. Neonatal jaundice, occurring within the first 28 days of life, is particularly significant due to its high prevalence—affecting 60% of term infants and 80% of preterm infants—and its potential to cause severe neurological complications such as kernicterus if left untreated [3,4].

Neonatal hyperbilirubinemia arises from increased bilirubin production due to the shorter lifespan of fetal red blood cells, immature hepatic conjugation mechanisms, and enterohepatic circulation [5]. While most cases are benign (physiological jaundice), severe hyperbilirubinemia can result from pathological conditions such as Rh/ABO incompatibility, G6PD deficiency, sepsis, and prematurity [6]. Physiological jaundice typically appears between 2-3 days of age, peaks by the fifth day, and resolves within a week in term infants, whereas preterm infants may experience prolonged jaundice lasting up to two weeks [7]. However, when serum bilirubin levels exceed 17 mg/dl (291 µmol/L), the condition is considered pathological, necessitating urgent medical intervention to prevent bilirubin encephalopathy [7]. Globally, neonatal jaundice remains a leading cause of hospital admissions, particularly in developing countries. In Nigeria, it accounts for 8.7% of neonatal admissions [8], while in Bangladesh, it contributes to 5.9% of neonatal hospitalizations, following perinatal asphyxia, low birth weight, and sepsis [9].

Despite being a common neonatal condition, severe hyperbilirubinemia continues to pose a significant public health challenge, particularly in low-resource settings where early diagnosis and treatment are often delayed. In Canada, the incidence of severe neonatal hyperbilirubinemia is estimated at 1 in 2,480 live births, with kernicterus cases still being reported due to inadequate monitoring and intervention [10]. In Bangladesh, limited studies have been conducted on neonatal jaundice, particularly within military healthcare settings, despite its high prevalence among admitted neonates. The lack of comprehensive data on risk factors, maternal and neonatal demographics, and morbidity patterns hinders the development of targeted interventions. Early identification of risk factors such as prematurity, hemolytic disorders, exclusive breastfeeding difficulties, and maternal-fetal blood group incompatibility is crucial for preventing adverse outcomes [6]. Given that neonatal jaundice is a preventable cause of long-term disability, there is an urgent need for research to improve screening, management, and parental education in tertiary care hospitals in Dhaka.

The current study's conceptual framework highlighted the multifactorial nature of neonatal jaundice, demonstrating how biological factors (prematurity, hemolytic disorders), maternal characteristics (blood group incompatibility, delivery complications), and environmental influences (place of delivery, breastfeeding practices) collectively determine disease severity. By systematically examining these interrelationships, the research findings are assumed to contribute valuable evidence to inform clinical practice and public health policy. The ultimate

goal was to develop more effective neonatal care strategies, enhance early detection methods, and implement targeted preventive measures, thereby reducing the significant burden of neonatal jaundice in Bangladesh's healthcare system and improving newborn health outcomes.

This study aimed to comprehensively evaluate neonatal jaundice cases at a tertiary hospital in Dhaka by examining its clinical types, associated risk factors, and socio-demographic determinants. The primary objective was to establish the prevalence and distribution of physiological versus pathological jaundice among admitted neonates. Specific objectives included: (1) clinically differentiating between physiological and pathological jaundice cases; (2) assessing key maternal and neonatal risk factors such as gestational age, birth trauma, and feeding practices; (3) analyzing maternal socio-demographic variables including age, education level, and family income; and (4) investigating associated neonatal complications like sepsis, respiratory distress syndrome, and congenital anomalies. These investigations are expected to provide crucial data for understanding the disease burden and patterns in this clinical setting.

Methodology:

This study employed a descriptive, cross-sectional design to assess neonatal jaundice cases at the Combined Military Hospital (CMH), Dhaka Cantonment. The study population comprised all neonates (0-28 days old) admitted to the neonatal and Neonatal Intensive Care Unit (NICU) wards with jaundice during the study period. Purposive sampling, a non-probability technique, was used to select 101 participants based on predefined criteria. Inclusion criteria consisted of (a) all admitted neonatal jaundice cases, (b) neonates aged 0-28 days, and (c) cases where mothers voluntarily consented to participate. On the other hand, acute emergency jaundice cases, neonates whose mothers did not provide consent, and outdoor (non-admitted) cases were excluded from the study as participants.

Data collection was conducted using a structured questionnaire, developed after a literature review and preliminary observations. Before implementation, the questionnaire was pre-tested on 10 respondents from Cantonment Military Hospital, Dhaka, to refine clarity and relevance. Formal approval was obtained from the Armed Forces Medical Institute (AFMI) and CMH Dhaka authorities. Data were collected through face-to-face interviews with mothers and a review of medical case sheets. The purpose of the study was explained to participants, and verbal consent was obtained prior to data collection to ensure ethical compliance.

Collected data were checked for consistency, coded, and analyzed using SPSS version 20.0. Descriptive statistics (mean, standard deviation) and inferential tests (chi-square) were applied to examine associations between variables. Ethical considerations included maintaining confidentiality, avoiding harm to participants, and obtaining informed consent. The findings were presented using tables, graphs, and charts to facilitate interpretation and support evidence-based recommendations for neonatal care improvement.

Results:

This section provides the key findings of this study which were collected from the study participants by the application of questionnaire.

Table 1 presents the socio-demographic characteristics of the 101 respondents. The majority of participants (47.5%) were aged between 20–25 years, followed closely by 45.5% in the 26–30 age group, indicating a predominantly young adult population. Most respondents identified as Muslim (85.1%), while smaller proportions were Hindu (12.9%) and Buddhist (2.0%). In terms of occupation, a significant majority were housewives (67.3%), with others being service holders (22.8%), businessmen (7.9%), and students (2.0%). Educational status varied, though most had completed HSC or equivalent (40.6%) and SSC or equivalent (26.7%), while only a small fraction was illiterate (1.0%) or had primary education (1.0%). The largest proportion of families (46.5%) reported a monthly income between BDT 10,000–20,000, followed by 36.6% in the BDT 20,001–30,000 range. Regarding housing, 64.4% lived in buildings, 31.75% in semi-building structures, and only 4.0% in clay houses, reflecting relatively stable living conditions for the majority.

Table 1: Distribution of Respondents According to Socio-Demographic Profile (n=101)

Socio-Demographic Variables	Category	Frequency	Percentage (%)
Age (in years)	20–25	48	47.5
	26–30	46	45.5
	31–35	4	4.0
	36–40	3	3.0
Religion	Muslim	86	85.1
	Hindu	13	12.9
	Buddhist	2	2.0
Occupation	Housewife	68	67.3
	Service holder	23	22.8
	Businessman	8	7.9
	Student	2	2.0
Educational Status	Illiterate	1	1.0
	Primary School	1	1.0
	Secondary School	13	12.9
	SSC or Equivalent	27	26.7
	HSC or Equivalent	41	40.6
Monthly Family Income (BDT)	10,000–20,000	47	46.5
	20,001–30,000	37	36.6
	30,001–40,000	8	7.9
	40,001–50,000	4	4.0
	50,001–60,000	5	5.0
Accommodation Type	Clay House	4	4.0
	Semi building	32	31.75
	Building	65	64.4

Table 2 highlights various risk factors associated with neonatal jaundice among the 101 respondents. The majority of neonates (83.2%) were aged between 0–7 days, with jaundice onset occurring predominantly within the first two days of life (55.4%), indicating early-onset jaundice. Male neonates were more affected (66.3%) than females. Most newborns had a birth weight between 2.2–3.1 kg (59.4%), and nearly four-fifths (79.2%) were born at full term (36–40 weeks gestation). About 29.7% of neonates experienced birth trauma. Breastfeeding was more common (61.4%) than bottle feeding. A high proportion of mothers (88.1%) reported taking medications during pregnancy, with vitamins (27.7%), insulin (26.7%), and Sardopa (24.8%) being the most used. Caesarean delivery was more frequent (59.4%) than normal vaginal delivery (40.6%). Most deliveries occurred in hospitals (82.0%), suggesting institutional delivery practices. A large percentage of neonates (83.2%) had Rh-negative blood group, whereas the same proportion of mothers were Rh-positive (83.2%), which may point to Rh incompatibility as a contributing factor to jaundice.

Table 2: Information Related to Risk Factors Associated with Neonatal Jaundice (n=101)

Variables	Categories	Frequency	Percentage (%)
Neonate's Age (in days)	0–7	84	83.2
	8–14	6	5.9
	15–21	6	5.9
	22–28	5	5.0
Neonate's Sex	Male	67	66.3
	Female	34	33.7
Age of Onset of Jaundice (in days)	Below 2	56	55.4
	3–5	40	39.6
	6–9	4	4.0
	Above 10	1	1.0
Birth Weight (in kg)	1.2–2.1	18	17.8
	2.2–3.1	60	59.4
	3.2–4.1	23	22.8
Gestational Age of Mother (weeks)	27–31	4	4.0
	32–35	17	16.8
	36–40	80	79.2

Birth Trauma	Yes	30	29.7
	No	71	70.3
Feeding Pattern	Breastfeeding	62	61.4
	Bottle feeding	39	38.6
Maternal Medicine Intake	Yes	89	88.1
	No	12	11.9
Type of Medicine Used	Vitamin	28	27.7
	Insulin	27	26.7
	Sardopa	25	24.8
	Narcotic Analgesics	11	10.9
	Diazepam	10	9.9
Mode of Delivery	LUCS (Caesarean)	60	59.4
	Normal Spontaneous Vaginal Delivery	41	40.6
Place of Delivery	Hospital	82	82.0
	Clinic	16	16.0
	Home	2	2.0
Neonate Blood Group	Rh (-ve)	84	83.2
	Rh (+ve)	17	16.8
Mother Blood Group	Rh (+ve)	84	83.2
	Rh (-ve)	17	16.8

Table 3 presents data on the morbidity status of neonates diagnosed with jaundice. Among the 101 neonates, nearly half (50.5%) were identified with pathological jaundice, while the remaining 49.5% had physiological jaundice, indicating an almost equal distribution between the two types. Neonatal sepsis was present in 39.6% of the cases, highlighting a significant coexisting health concern. Additionally, 19.8% of the neonates had congenital anomalies, while the majority (80.2%) did not.

Table 3: Information Regarding the Morbidity Status of the Neonate (n=101)

Morbidity Variable	Categories	Frequency	Percentage (%)
Type of Neonatal Jaundice	Pathological Jaundice	51	50.5
	Physiological Jaundice	50	49.5
Neonatal Sepsis	Present	40	39.6
	Absent	61	60.4
Congenital Anomaly	Present	20	19.8
	Absent	81	80.2

Table 4 examines the relationship between neonatal jaundice type (physiological vs. pathological) and several independent variables among 101 neonates. A statistically significant association was observed between the mother's age and type of jaundice ($p<.01$), with younger mothers (20–25 years) more likely to have neonates with physiological jaundice, while older mothers (26–40 years) were associated with pathological cases. Although family income and type of accommodation showed no significant association with jaundice type, early onset of jaundice (before 2 days) was significantly linked to pathological jaundice ($p=.04$). Birth weight also had a significant association ($p=0.00$), with higher birth weights (3.2–4.1 kg) more common among neonates with pathological jaundice. Furthermore, morbidity status revealed strong correlations: neonatal sepsis was predominantly present in physiological jaundice cases, whereas prematurity, Rh incompatibility, and congenital anomalies were exclusively associated with pathological jaundice ($p=0.02$). No significant differences were found by sex of the neonate ($p=0.98$).

Table 4: Relationship Between Neonatal Jaundice and Independent Variables (n=101)

Variable	Category	Physiological Jaundice	Pathological Jaundice	P Value
Age of Mother (years)	20–25	47 (46.5%)	1 (1.0%)	**<.01**
	26–30	3 (3.0%)	43 (42.6%)	
	31–35	0 (0.0%)	4 (4.0%)	
	36–40	0 (0.0%)	3 (3.0%)	
Monthly Family Income (Taka)	10,000–20,000	25 (24.8%)	22 (21.8%)	0.13
	20,001–30,000	20 (19.8%)	17 (16.8%)	
	30,001–40,000	5 (5.0%)	3 (3.0%)	
	40,001–50,000	0 (0.0%)	4 (4.0%)	

	50,001–60,000	0 (0.0%)	5 (5.0%)	
Accommodation	Clay	3 (3.0%)	1 (1.0%)	0.25
	Building	36 (35.6%)	29 (28.7%)	
	Semi-building	11 (10.9%)	21 (20.8%)	
Sex of the Baby	Male	33 (32.7%)	34 (33.7%)	0.98
	Female	17 (16.8%)	17 (16.8%)	
Age of Onset of Jaundice (days)	<2	27 (26.7%)	29 (28.7%)	**.04**
	3–5	19 (18.8%)	21 (20.8%)	
	6–9	4 (4.0%)	0 (0.0%)	
	>10	0 (0.0%)	1 (1.0%)	
Neonate's Weight (kg)	1.2–2.1	10 (9.9%)	8 (7.9%)	**0.00**
	2.2–3.1	34 (33.7%)	26 (25.7%)	
	3.2–4.1	6 (5.9%)	17 (16.8%)	
Morbidity Status	Neonatal Sepsis	39 (38.6%)	1 (1.0%)	**0.02**
	RDS	11 (10.9%)	6 (5.9%)	
	Prematurity	0 (0.0%)	15 (14.9%)	
	Rh Incompatibility	0 (0.0%)	15 (14.9%)	
	Congenital Anomaly	0 (0.0%)	14 (13.9%)	

Discussion:

This descriptive cross-sectional study was conducted at the neonatal ward, NICU, and child OPD of Combined Military Hospital (CMH), Dhaka, to assess the types of neonatal jaundice and identify associated risk factors. Among 539 neonates admitted during the study period, 101 cases (18.74%) were diagnosed with neonatal jaundice. This prevalence is comparable to the findings of Rahim et al. (2007) in Pakistan, who reported a neonatal jaundice incidence of 19.95% among admitted neonates [11], indicating a similar burden of the condition in South Asian settings.

The present study revealed that pathological jaundice was more prevalent (50.5%) than physiological jaundice. This contrasts with a study by Rasul et al., (2010), who found physiological jaundice (26.7%) to be the most common type [12]. The higher proportion of

pathological jaundice in this study could reflect better detection of underlying causes, such as sepsis, Rh-incompatibility, and congenital anomalies, in the military hospital setting.

The age of onset of jaundice also showed significant trends, with 55.4% of cases appearing within the first two days of life—an indicator typically associated with pathological causes. Similar findings were reported by Parkash and Das (2001), who emphasized early-onset jaundice as a marker of higher risk and the need for early intervention [13]. This further supports the argument for strengthening perinatal surveillance.

In terms of sex distribution, a higher proportion of male neonates (67%) experienced jaundice, aligning with findings from a Nigerian study, where males were more affected by physiological jaundice [8]. This male predominance could be due to biological vulnerability or genetic predisposition, as suggested in several studies [8].

Birth weight was another crucial factor, with 59.4% of jaundiced neonates falling within the 2.2–3.1 kg range. Although 84.6% of jaundiced neonates had normal birth weight (>2.5 kg), a notable proportion (17.8%) were low birth weight. A similar distribution was reported in a Bangladeshi study which found low birth weight contributing to 25.7% of neonatal admissions [9]. While normal birth weight babies were more frequently affected in the current study, the presence of low birth weight as a contributing factor to neonatal jaundice cannot be overlooked.

Gestational age also played a role, with 79.2% of neonates being full-term. This is consistent with findings by Bahl et al. (2009) in India, who reported a higher incidence of jaundice among full-term neonates (81%) [14]. However, preterm infants in the current study were more frequently associated with pathological jaundice, particularly due to conditions such as respiratory distress syndrome and Rh-incompatibility.

Regarding delivery characteristics, 59.4% of neonates were delivered via lower uterine cesarean section (LUCS), while 40.6% were delivered normally. Institutional deliveries accounted for 98% of cases, suggesting good access to health facilities in the military population. Ensuring safe delivery practices through institutional care is vital to reducing neonatal complications, including jaundice.

The study also explored morbidity status, revealing that neonatal sepsis was the most common comorbid condition (39.6%), followed by respiratory distress syndrome (16.8%), prematurity (14.9%), Rh-incompatibility (14.9%), and congenital anomalies (13.9%). These findings highlight the multifactorial nature of pathological jaundice, supporting the need for comprehensive neonatal assessments and infection control measures, as suggested by a prior research [12].

Feeding practices revealed that most neonates (61.4%) were exclusively breastfed, while others received bottle feeding in addition. In contrast, Indian studies have noted exclusive breastfeeding among all infants [14]. Early initiation and maintenance of exclusive breastfeeding may reduce the risk of dehydration-related hyperbilirubinemia.

The study also observed a significant relationship between the timing of jaundice onset and its type (p=0.04). Pathological jaundice was more likely to manifest within the first 48 hours of life, consistent with prior studies that associate early-onset jaundice with serious underlying conditions such as hemolytic disease, infections, or metabolic disorders [15]. This early onset necessitates prompt evaluation and intervention to prevent complications such as kernicterus.

Birth weight was significantly associated with the type of jaundice (p=0.00), with neonates in the 3.2–4.1 kg range being more commonly affected by pathological jaundice. While this might seem counterintuitive as low birth weight is generally associated with increased health risks, it may indicate undiagnosed complications in higher-weight neonates such as polycythemia or cephalohematoma contributing to bilirubin overload. Comparable findings were noted by Agarwal et al. (2012), who observed that macrosomic infants can also exhibit elevated bilirubin levels due to perinatal stress [16].

Regarding coexisting neonatal morbidities, a significant association was found between morbidity types and jaundice type (p=0.02). Neonatal sepsis was more prevalent in physiological jaundice cases, which could reflect overlapping symptoms or delayed diagnosis, while prematurity, Rh incompatibility, and congenital anomalies were exclusively associated with pathological jaundice. These findings support a previous study that identify these factors as major contributors to severe neonatal hyperbilirubinemia requiring clinical management [17].

Interestingly, the sex of the neonate showed no statistically significant association with the type of jaundice (p=0.98), which contrasts with studies reporting a male predominance in neonatal jaundice incidence [8]. The absence of sex-based differences in the present study could be due to the limited sample size or demographic characteristics of the population.

Family income and type of housing accommodation were not significantly associated with the type of jaundice. This may be due to the uniformity of care standards at the military hospital setting, where most neonates likely received similar levels of medical attention regardless of socio-economic status.

Limitations:

This study had several limitations that should be considered when interpreting the findings. Firstly, it was conducted at a single tertiary care hospital (CMH Dhaka), which may limit the generalizability of the results to broader populations or other healthcare settings. Secondly, the sample size was relatively small (n=101 jaundiced neonates), which may reduce the statistical power and robustness of the associations observed. Additionally, the purposive sampling technique may introduce selection bias, and certain potential confounding variables—such as maternal nutritional status, antenatal history, and genetic factors—were not assessed. Laboratory data such as serum bilirubin levels or diagnostic imaging were also not included, which could have provided deeper insight into the severity and etiology of jaundice.

Conclusion:

This study highlights key maternal and neonatal factors associated with the type of neonatal jaundice among admitted cases at CMH Dhaka. The findings demonstrate that maternal age, early onset of jaundice, birth weight, and coexisting neonatal morbidities such as prematurity, Rh incompatibility, and congenital anomalies are significantly associated with pathological jaundice. Conversely, no significant associations were found with neonatal sex, family income, or type of accommodation. These results underscore the importance of early risk assessment and targeted clinical evaluation to differentiate between physiological and pathological jaundice. Timely identification of high-risk neonates can facilitate appropriate intervention and prevent severe complications such as acute bilirubin encephalopathy and kernicterus. Further multicenter studies with larger sample sizes are recommended to generalize these findings and guide evidence-based neonatal care practices.

Recommendations:

Based on the findings and limitations, several recommendations can be proposed. Comprehensive neonatal screening programs should be implemented to facilitate early detection and management of pathological jaundice, especially among high-risk groups identified in this study. Health education for mothers, particularly older and high-risk pregnant women, should be strengthened to increase awareness about neonatal jaundice and its complications. Antenatal and postnatal care services should emphasize monitoring for jaundice-related risk factors, including birth weight, prematurity, and Rh incompatibility. Future research should adopt multicenter approaches with larger and randomized samples, and incorporate biochemical and clinical diagnostics to validate and expand upon these findings**.**

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