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Clinical Profile and Causes of Neonatal Jaundice: A Prospective Observational Study in a Tertiary Care Hospital in Eastern India

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ABSTRACT
Background: Neonatal jaundice is a common condition affecting up to 60% of term and 80% of preterm newborns, often leading to delayed hospital discharge or readmission. While many cases are transient, severe hyperbilirubinemia can lead to kernicterus and irreversible neurological complications, including cerebral palsy and hearing loss. The timely diagnosis and management of neonatal jaundice are crucial to prevent such outcomes. This study aimed to assess the clinical profile and underlying causes contributing to neonatal jaundice in a tertiary care setting.
Methods: From May 2021 to April 2022, a prospective observational study was carried out in the pediatric department of MKCG Medical College and Hospital in Berhampur, Odisha. Two hundred newborns admitted with blood bilirubin levels greater than 10 mg/dl were included in the study. Neonates with jaundice attending the outpatient department or discharged against medical advice were excluded. Comprehensive data were recorded, including antenatal, delivery details, and clinical examination findings. Laboratory tests assessed bilirubin levels, blood group compatibility, and additional factors like G6PD deficiency and sepsis. Data analysis was performed using descriptive and inferential statistics.
Results: Out of 200 neonates, jaundice onset occurred after 72 hours in 53.5% of cases, while 30.5% developed jaundice within the first 24 hours. A higher prevalence was noted among male neonates (64.5%) and those delivered vaginally (57.5%). Etiological factors included physiological jaundice (32%), prematurity (24.5%), and breastfeeding-related jaundice (10%). ABO incompatibility (5.5%), Rh incompatibility (11%), and sepsis (4%) were also identified as contributing factors.
Conclusion: Male gender, birth weight of 2500-4000 grams, vaginal delivery, and prematurity were common risk factors associated with neonatal jaundice. Early diagnosis, parent counseling, and monitoring are essential for effective management and prevention of complications associated with hyperbilirubinemia.

Key-words: Neonatal jaundice, Hyperbilirubinemia, Risk factors, Physiological jaundice, Prematurity, ABO incompatibility, Rh incompatibility, Tertiary care

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INTRODUCTION

Neonatal jaundice is among the most frequently observed conditions during the first week of life, affecting approximately 60% of full-term newborns and up to 80% of those born preterm within this period. [1] It is one of the main reasons for delayed hospital discharge and re-admissions within the initial week after birth. [2,3] When jaundice becomes severe, there is a risk of bilirubin encephalopathy or kernicterus, which may lead

to permanent neurological impairments if not treated promptly. This includes complications such as cerebral palsy, gaze abnormalities, and hearing loss, which are irreversible yet preventable with timely identification and suitable treatment of newborn jaundice.

Effective management requires identifying the etiological factors and risk contributors for neonatal jaundice. Jaundice, characterized by yellow discolouration of the skin and sclera, results from elevated bilirubin levels, a byproduct of heme degradation. The majority (80-90%) of hyperbilirubinemia cases result from hemoglobin breakdown. Both physiological and pathological factors contribute to neonatal hyperbilirubinemia. Physiologically, neonates are predisposed due to more red blood cells with a shorter life span, making them more susceptible to hemolysis. [4,5]

Neonates also experience increased enterohepatic circulation because of reduced gastrointestinal motility in the first few days of life, leading to bilirubin reabsorption. Physiological factors like limited breast milk intake may also contribute, and delayed cord clamping has been noted as a potential risk factor. Pathological causes, on the other hand, include conditions such as ABO and Rh incompatibility, sepsis, asphyxia, and exposure to hemolytic agents. However, in over half of neonatal hyperbilirubinemia cases, the exact cause remains unknown. [6] Due to the potential severity, inpatient treatment and careful monitoring are often necessary, and hospital readmission is not uncommon. [7] The estimated incidence of jaundice in late-term and term infants ranges from 60% to 84%. [8]

Although only 5-10% of newborns with jaundice require treatment for pathological hyperbilirubinemia, the risk of neurological damage remains, especially in cases with very high bilirubin levels, the presence of certain risk factors, or inappropriate management. [9] Various protocols, including early breastfeeding initiation, Rh D prophylaxis, phototherapy, exchange transfusions, and intravenous immunoglobulin, aim to reduce the incidence and severity of neonatal jaundice. Nevertheless, cases of severe hyperbilirubinemia and bilirubin encephalopathy are still encountered.

MATERIALS AND METHODS

The pediatric department at MKCG Medical College and Hospital in Berhampur, Odisha, was the site of this prospective observational study. The study took place over a 12-months, from May 2021 to April 2022, with prior approval from the institutional ethical committee.

Inclusion Criteria- Neonates admitted to the NICU or neonatology ward with jaundice and serum bilirubin levels exceeding 10 mg/dl during the study period were included.

Exclusion Criteria- Neonates with jaundice who were not admitted to the NICU (such as those who were only seen in the outpatient department), neonates whose parents chose to discharge them against medical advice, and situations in which the parents refused to take part in the study were all excluded.

Parents were given a thorough explanation of the study's objectives, and their written informed consent was acquired. Each newborn's complete medical history was gathered, including the mother's prenatal and delivery information.

Clinical Examination and Laboratory Assessment- Each baby underwent a clinical examination assessing jaundice severity. Examinations took place in natural daylight against a white background to ensure accuracy. Laboratory tests included measurements of total and fractionated serum bilirubin levels and both the neonate's and mother's blood groups (Rh and ABO).

Additional tests were conducted as required, such as the direct Coombs test, G6PD screening, reticulocyte count, hematocrit, and sepsis screening. Neonates were followed up until they reached 30 days of age. All data were systematically collected in a predesigned format for analysis.

Statistical Analysis- Data collected throughout the study were analyzed using R-software, a powerful tool for statistical analysis. Descriptive statistics were used to summarize clinical and demographic variables. Inferential statistics, such as t-tests or chi-square tests, were applied as appropriate to examine potential associations between various risk factors and jaundice severity. Regression analysis was also employed to determine the strength of predictors for neonatal jaundice, allowing for robust conclusions to be drawn from the study findings.

RESULTS

During the study period, 200 neonates satisfied the inclusion and exclusion criteria. Of these, 107 newborns (53.5%) became jaundiced 72 hours after delivery, while 30.5% developed jaundice within the first 24 hours. Males comprised 64.5% of cases, compared to 35.5% of females. Interestingly, neonatal jaundice was more prevalent among infants delivered at over 37 weeks of gestation (59%), while only 9.5% of cases involved neonates born between 28-32 weeks of gestational age. Among the study group, 64% of infants weighed 2500-4000 grams at birth, while 36% weighed less than 2500 grams. Regarding the mode of delivery, jaundice incidence was highest in those born by vaginal delivery (57.5%), followed by cesarean section (33%) and instrumental delivery (9.5%) (Table 1).

Table 1: General Characteristics of Newborns with Jaundice

Characteristics (200)	No. of newborns	Percentage
Age of onset of jaundice (hours)		
0-24	61	30.5
24-72	32	16
>72	107	53.5
Gender		
Male	129	64.5
Female	71	35.5
Gestational age at birth (weeks)		
28-32	19	9.5
33-36	63	31.5
>37	118	59
Birth weight (gm)		
<2500	72	36
2500-4000	128	64
>4000	NA	-
Mode of delivery		
Vaginal delivery	115	57.5
Instrumental delivery	19	9.5
C-section delivery	66	33

The main causes of jaundice in this cohort were physiological jaundice (32%), prematurity (24.5%), and breastfeeding-related jaundice (10%). Less common etiologies included ABO incompatibility (5.5%), sepsis (4%), Rh incompatibility (11%), cephalhematoma (4.5%), hemolytic anemia (1%), G6PD deficiency (1%), and hypothyroidism (1.5%) (Table 2).

Table 2: Etiology of Neonatal Jaundice

Etiology	No. of newborn	Percentage
Physiological	64	32
Prematurity	49	24.5
Breastfeeding	20	10
Idiopathic	10	5
Abo incompatibility	11	5.5
Sepsis	8	4
Rh incompatibility	22	11
Cephalhematoma	9	4.5
Haemolytic anemia	2	1
G6PD deficiency	2	1
Hypothyroidism	3	1.5
Total	200	100

The most common symptoms included jaundice with good activity 46 (23%) and jaundice accompanied by feeding refusal 66 (33%). Additionally, delayed crying 38 (19%), fever 25 (12.5 %), and vomiting 25 (12.5 %) were recorded as notable symptoms (Table 3).

Table 3: Common Symptoms Observed in Jaundiced Newborns

Symptoms	No. of newborns	Percentage
Yellowish discoloration with good activity	46	23
Jaundice with refusal of feeds	66	33
History of delayed cry	38	19
Fever	25	12.5
Vomiting	25	12.5

DISCUSSION

During the first month of life, newborn jaundice is a common cause of hospitalization. Although newborn jaundice usually goes away in the first week of life, severe episodes can result in kernicterus and acute

bilirubin encephalopathy, which increases the risk of death and permanent neurological impairments. These complications may include mental impairment, movement disorders, seizures, high-frequency hearing loss, and speech difficulties. Therefore, timely identification and intervention in neonatal jaundice are essential to avoid such outcomes.

In this study, 59% of neonates with jaundice were born at or after 37 weeks of gestation, while 9.5% were early preterm. Studies have reported a higher prevalence of neonatal jaundice in premature infants due to factors such as early detection and proactive management in postnatal wards [10]. Male gender is recognized as a risk factor for hyperbilirubinemia, as demonstrated by multiple studies indicating a higher occurrence in male newborns than in females.[11,12]

Regarding the mode of delivery, 57.5% of cases were associated with vaginal deliveries, while 9.5% were instrumental deliveries and 33% were cesarean sections. Findings from other studies support an increased incidence of neonatal jaundice in vaginal deliveries compared to cesarean sections.[13,14] Physiological jaundice, observed in 32% of cases in this study, is common in neonates as immature liver enzymes result in elevated bilirubin levels, typically appearing by the second or third day, peaking between the second and fourth days and subsiding by the fifth to seventh days. The prevalence of physiological jaundice in neonatal jaundice cases is increased by factors such as maternal diabetes, ethnicity, preterm, medication use, male gender, cephalohematoma, breastfeeding, weight loss, and delayed stool transit. [15]

Prematurity was the second most common cause of jaundice (24.5%), a finding well-documented in previous research. [9,16] Breast milk jaundice, occurring when bilirubin levels peak between the sixth and fourteenth days, was identified in this study. This condition, observed in approximately one-third of breastfed infants, is attributed to maternal milk components such as beta-glucuronidases and non-esterified fatty acids, which may interfere with bilirubin metabolism.[17,18] An idiopathic etiology was noted in 5% of cases, aligning with rates in other studies that identified idiopathic causes in 15.5-25.4% of cases.[19,20]

ABO incompatibility (5.5%) and Rh incompatibility (11%) were identified as significant risk factors for neonatal jaundice in this study, as they can induce hemolysis, a primary mechanism for jaundice in such cases. [11,21] Sepsis, present in 4% of cases, has been highlighted as a notable risk factor for neonatal jaundice in several studies. [22] Other less common causes observed included cephalhematoma (4.5%), hemolytic anemia (1%), G6PD deficiency (1%), and hypothyroidism (1.5%). Cephalhematoma, often resulting from delivery-related trauma, especially with instrumental deliveries, is an avoidable factor. Hemolytic anemia and G6PD deficiency contribute to jaundice primarily through hemolysis, while hypothyroidism-induced jaundice is often linked to associated polycythemia.

CONCLUSIONS

This study highlights that neonatal jaundice is still a common cause of morbidity in neonates by offering a thorough grasp of the clinical profile and key etiological variables linked to the condition in a tertiary care setting. The findings reveal that physiological jaundice, prematurity, male gender, vaginal delivery, and birth weights between 2500 and 4000 grams are significant risk factors for neonatal jaundice. While the majority of cases were due to physiological jaundice, other notable causes included prematurity, breastfeeding-related jaundice, and less common yet critical factors like ABO and Rh incompatibility and sepsis.

In conclusion, while physiological jaundice remains common and generally manageable, early identification and proactive management of higher-risk cases are critical to preventing severe hyperbilirubinemia and its potentially irreversible neurological complications. Further research may benefit from exploring preventive interventions and long-term outcomes among neonates with varied etiological backgrounds, contributing to enhanced protocols and health outcomes in neonatal jaundice management.

CONTRIBUTION OF AUTHORS

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