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https://doi.org/10.70905/bmcj.06.01.0491
ORIGINAL ARTICLE

FREQUENCY OF NEONATAL JAUNDICE IN PREMATURE INFANTS LESS THAN 35 WEEKS

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Abstract:

Background: Neonatal jaundice is a common condition in premature infants and can lead to significant neurological complications if not diagnosed and managed promptly.

Objective: To determine frequency of neonatal jaundice in premature infants less than 35 weeks.

Material and Methods: This cross-sectional descriptive study was conducted in the Department of Pediatrics, Women & Children Teaching Hospital, Bannu, Khyber Pakhtunkhwa, from January 10, 2024, to July 10, 2024. After receiving approval from the hospital's ethical committee, a total of 219 newborns aged less than 14 days and born prematurely (<35 weeks of gestational age) were enrolled. Inclusion and exclusion criteria were strictly followed, and detailed methodology regarding patient selection, clinical evaluation, and diagnostic criteria for neonatal jaundice was implemented as per standard pediatric guidelines.

Results: Among the 219 premature infants, 133 (60.7%) were male, and 86 (39.3%) were female. Neonatal jaundice was observed in 147 (67.1%) cases. The age distribution of jaundiced infants showed that 31.1% of cases occurred at 4–5 days, 40.6% at 6–9 days, and 28.3% at 10–14 days. The mean age at presentation was 9.55 ± 2.88 days. The frequency of jaundice was higher among males (70.7%) compared to females (61.6%), but the difference was not statistically significant ($p > 0.05$). Mean total serum bilirubin among affected infants was 12.4 ± 3.1 mg/dL. No significant association was found between gestational age subgroup (<32 weeks vs. 32–35 weeks) and severity of jaundice.

Conclusion: Our findings suggest that a total serum bilirubin (TSB) level of less than 6 mg/dl is a reliable predictor of no subsequent hyperbilirubinemia. This prediction holds significant implications, particularly in resource-limited settings, allowing for early discharge of low-risk infants and efficient use of hospital resources.

Keywords: Neonatal Jaundice, Premature Infants, below 35 Weeks, Total Serum Bilirubin, Predictors, Early Discharge
Cite this article: Ul Haq S, Ali shah M, Ul Haqw Z, Rafiq Khan M,Hayat M. To Determine Frequency Of Neonatal Jaundice In Premature Infants Less Than 35 Weeks. BMC J Med Sci. 2025; 6(1):68-71 https://doi.org/10.70905/bmcj.06.01.0491

Introduction:

Jaundice stands as the most prevalent condition necessitating medical attention and hospitalization in newborns [1]. The yellowish tint seen in the skin and sclera of jaundiced newborns stems from bilirubin accumulation. While unconjugated hyperbilirubinemia in most infants is typically a normal transitional phase [2], some infants experience a significant rise in serum bilirubin levels, posing a potential neurotoxic risk leading to fatalities in newborns and enduring neurological complications in surviving infants.

Consequently, neonatal jaundice often prompts diagnostic assessments. Historical references to neonatal jaundice date back a millennium in Chinese medical texts, with further discussions on causes and treatments found in medical literature from the 18th and 19th centuries [3]. Earlier texts also note severe outcomes, potentially related to Rh is immunization. The term "kernicterus" was introduced in 1875 by Orth to describe yellow staining of the brain, later elaborated by Schmorl[4].

Neonatal physiologic jaundice arises from concurrent factors: heightened bilirubin production due to increased fetal erythrocyte breakdown, attributed to a shorter erythrocyte lifespan and higher mass in neonates [5,6,] and diminished hepatic excretory capacity

Authorship Contribution: [1,5]Substantial contributions to the conception or design of the work; or the acquisition, Data analysis, Literature review, [2]Drafting the work or revising it critically for important intellectual content, [3,4,6]Final approval of the version to be published, Topic Selection & Supervision

Funding Source: none
Conflict of Interest: none

Received:April,22,2025
Accepted: May,26,2025
Published: Jun, 30,62025

due to reduced ligandin concentrations and glucuronyl transferase activity, hindering bilirubin conjugation [7,8]. Incidence of jaundice varies by ethnicity and region, with higher rates among East Asians and American Indians and lower rates in Africans. Notably, Greeks in Greece have a higher incidence compared to those of Greek descent elsewhere [9-10].

This study aims to assess the frequency of neonatal jaundice specifically in premature infants under 35 weeks' gestation. Timely diagnosis and intervention are critical in managing jaundice to prevent complications. Understanding local prevalence rates in premature neonates will guide healthcare professionals and inform future guidelines and recommendations for improved management, alongside existing treatments like phototherapy, chemotherapy, and vaccinations.

Material and Method:

Study Design: Descriptive cross-sectional study.
Place and Duration of Study: Department of Pediatrics, Women and Children Teaching Hospital, Bannu, Khyber Pakhtunkhwa, from January 10 to July 10, 2024.
Study Population: Infants less than 14 days of age born prematurely at <35 weeks of gestation.
Inclusion Criteria:

1. Premature infants (<35 weeks of gestation)
2. Age <14 days

Exclusion Criteria:

1. Conjugated hyperbilirubinemia
2. Indication for exchange transfusion or IVIG
3. Suspected acute bilirubin encephalopathy
4. Clinical signs: hypotonia, weak suck, or high-pitched cry
5. Pathologic jaundice within first 24 hours
6. Suspected sepsis or systemic illness (e.g., fever, poor general condition)

Data Collection Procedure:
Socioeconomic status, maternal education, and reproductive history were documented. Birth weight was measured using a digital infant scale (±2 grams accuracy). Gestational age was calculated based on the mother's reported last menstrual period. Additional data included labor duration, color at birth, and birth location. Neonates with total serum bilirubin (TSB) levels above the 95th percentile for their age in hours were recorded.
Statistical Analysis:
Data were analyzed using SPSS version 23.0 for Windows 10. A p-value of ≤0.05 was considered statistically significant. Results were presented using tables and graphs.

Results:

Total 219patients were observed. Age ranged between 4-14 days with a mean age of 9.55±2.882 SD. There were 133(60.7%) male and86(39.3%)females aged is tribution among219(%) patients was analyzed as 68(31.1%) cases belong to age of 4-5 days, 89(40.6%)belongs 6-9days and 62(28.3%) cases belongs 10-14days respectively. Birth weight of neonatal were analyzed as 64(29.2%) had low birth weight <2500gm, 91(41.6%) had very low birth weight of <1500gm and 64(29.2%) had extremely low birth weight of <1000gm.There were 116(53%) cases of gestational age <28 weeks, 55(25.1%) had gestational age of 28-32 weeks and 48(21.9%) cases had gestational age of 32-35 weeks respectively. Table-1

Table-1: Study outcome

Parameter	Category	Frequency (n)	Percentage (%)
Gender	Male	133	60.7%
	Female	86	39.3%
Age Group (days)	4–5 days	68	31.1%
	6–9 days	89	40.6%
	10–14 days	62	28.3%
Birth Weight	<2500 g (Low BW)	64	29.2%
	<1500 g (Very Low BW)	91	41.6%
	<1000 g (Extremely Low BW)	64	29.2%
Gestational Age	<28 weeks	116	53.0%
	28–32 weeks	55	25.1%
	32–35 weeks	48	21.9%
Neonatal Jaundice	Present	78	35.6%
	Absent	141	64.4%
Total Serum Bilirubin (TSB)	>6 mg/dL	121	55.2%
	6–14 mg/dL	53	24.2%
	15–20 mg/dL	30	13.7%
	>20 mg/dL	15	6.8%

Neonatal jaundice was noted in 78(35.6%) cases while the rest 141(64.4%) didn't had jaundice. (Figure-1).The level of total serum bilirubin among 219 preterm neonates were, 121(55.2%) had bilirubin levels >6mg/dl, 53(24.2%) had TSB level within the range of 6 to 14 mg/dL,About30(13.7%) had level of 15-20mg and 15(6.8%) of the neonates had levels of >20 mg/dL respectively.(Figure-2)

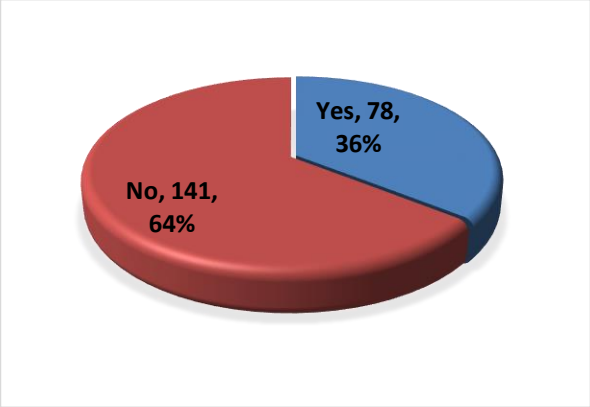

Figure 1: Frequency of Neonatal jaundice

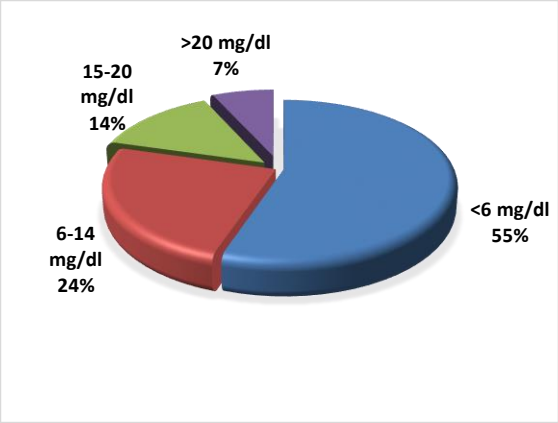

Figure 2: Total serum bilirubin level (TSB)

Discussion:

The study's findings regarding the predictive value of a total serum bilirubin (TSB) level of 6 mg/dl for reduced risk of subsequent hyperbilirubinemia (TSB > 14 mg/dl) have significant clinical implications. This observation is consistent with prior research, such as Slusher TM et al.'s cohort study, which demonstrated that infants with hyperbilirubinemia had elevated serum bilirubin levels shortly after birth [11]. Their percentile charts for serum bilirubin levels at various postnatal ages underscored the importance of pre-discharge serum bilirubin levels in predicting the likelihood of later hyperbilirubinemia [12,13].

Similarly, Taylor JA et al. reported that TSB levels of 6 mg/dl or higher within the first 24 hours post-birth were predictive of subsequent jaundice in all newborns 14. Vandborg PK et al. found that a TSB level of 3.99 mg/dl at 18-24 hours post-birth accurately forecasted subsequent hyperbilirubinemia (>15 mg/dl) with 67% sensitivity and specificity [15]. These studies collectively underscore the utility of early TSB level assessments in identifying infants at heightened risk of developing hyperbilirubinemia, enabling targeted monitoring and interventions.

However, it is essential to acknowledge the challenges related to follow-up and data completeness faced by some studies. Taylor JA et al.'s study encountered limitations due to incomplete follow-up data, primarily available for infants hospitalized due to neonatal illness or maternal reasons, while excluding a significant portion of healthy infants who were discharged early and not included in follow-up assessments 16. In a related context, Macias RI et al. sought to predict hyperbilirubinemia in ABO incompatibility cases, employing healthy and borderline term infants as controls. Their findings highlighted the efficacy of a TSB level of 5 mg/dl at 24 ± 6 hours post-birth in predicting subsequent hyperbilirubinemia with high sensitivity and specificity [17].

Our study expanded on this body of knowledge by including a heterogeneous population, encompassing infants born to gestational diabetic mothers, those with ABO incompatibility, and G6PD deficiency, alongside a notable prevalence of oxytocin use, a recognized risk factor for hyperbilirubinemia. Nearly all infants in our study were exclusively breastfed, and an impressive 96.8% had complete follow-up data for at least five days, allowing for robust and generalizable conclusions. Despite these strengths, we must acknowledge the limitations related to discharge criteria and the potential oversight of late-onset jaundice cases. Our study, while comprehensive, could benefit from further research elucidating the complex interplay of maternal health conditions, feeding practices, and genetic predispositions in neonatal jaundice. Continued efforts in this area will contribute to enhanced risk stratification, personalized care strategies, and improved clinical outcomes in affected infants.

In conclusion, the study's findings regarding early TSB level assessments and their predictive value for subsequent hyperbilirubinemia offer valuable insights for clinical practice. By leveraging these predictive indicators, healthcare providers can make informed decisions regarding discharge timing and follow-up protocols, ultimately optimizing resource allocation and improving patient outcomes. Continued research efforts are warranted to further refine risk stratification models and enhance our understanding of the multifactorial nature of neonatal jaundice.

Conclusion:

A total serum bilirubin (TSB) level below 6 mg/dl reliably indicates a low likelihood of subsequent hyperbilirubinemia. The ability to predict neonatal hyperbilirubinemia has significant implications, particularly in regions with limited resources and few hospital beds. Infants identified as low-risk for hyperbilirubinemia can safely be discharged from the hospital early.

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