Risk Factors of Neonatal Jaundice Among Newborns Admitted in a Tertiary Care Centre of Western Nepal

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ABSTRACT

Background

Neonatal hyperbilirubinemia remains a significant contributor to morbidity during the early days of life, particularly within the first week. Its underlying causes are often diverse and multifactorial. This study aimed to identify risk factors associated with neonatal hyperbilirubinemia and to explore the relationship between these factors and the severity of the condition in neonates admitted to a tertiary care center in western Nepal.

Method

An observational cross-sectional study was conducted at the Neonatal Intensive Care Unit (NICU) and Special Care Baby Unit (SCBU) of Lumbini Medical College from July 2017 to June 2018. Neonates aged 0–7 days admitted during this period were consecutively enrolled. Comprehensive clinical evaluations were performed, and relevant laboratory investigations were obtained. Data were analyzed using SPSS version 21.

Result

Among the 169 neonates enrolled, 129 (76.3%) were diagnosed with jaundice. Of these, 68% were full-term and 32% preterm. Most cases (78.3%) developed jaundice within the first three days of life, with the highest incidence observed on day two (47.3%), followed by day three (24.9%) and day four (12.4%). Male infants were more frequently affected.

Conclusion

This study underscores the prevalence of neonatal hyperbilirubinemia in the early neonatal period and highlights multiple associated risk factors. Prompt recognition and management are essential to reduce potential complications.

Keywords: Neonatal jaundice; hyperbilirubinemia; risk factors; early neonatal period; bilirubin.

Introduction

Neonatal jaundice, marked by a yellow tint of the skin, eyes, and mucous membranes, results from elevated bilirubin levels in the blood. Hyperbilirubinemia in newborns is typically defined as a serum bilirubin concentration above 5 mg/dL and occurs when bilirubin production surpasses its elimination.[1] It is one of the most common clinical findings in the neonatal period, affecting approximately 60% of term and up to 80% of preterm infants within the first week of life.[2]

This condition remains a major cause of hospital admissions during early neonatal life and can contribute significantly to neonatal morbidity and mortality if not identified and managed promptly.[3] Early detection is essential, as most cases can be effectively treated with non-invasive methods such as phototherapy. Timely intervention helps prevent progression to severe complications, including acute bilirubin encephalopathy and kernicterus. This study aims to identify risk factors associated with neonatal jaundice to guide early and appropriate management strategies.

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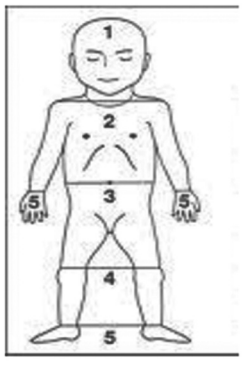
Materials and methods

This observational cross-sectional study was conducted over a one-year period, from July 2017 to June 2018, in the Neonatal Intensive Care Unit (NICU) and Special Care Baby Unit (SCBU) of Lumbini Medical College, located in Western Nepal. Ethical approval was obtained from the Institutional Review Committee (IRC) of the college. Written informed consent was secured from either parent or legal guardian prior to enrolling each neonate.

All neonates aged 0 to 7 days, including both term and preterm infants admitted to the NICU or SCBU during the study period, were eligible for inclusion. Infants with known congenital infections diagnosed in utero and those whose guardians declined consent were excluded.

A consecutive sampling technique was employed, enrolling all neonates who met the inclusion criteria. Upon admission, each newborn underwent a visual examination for jaundice. Clinical assessment of jaundice severity was performed using Kramer's rule, which categorizes jaundice into five body zones (Figure 1) based on its cephalocaudal progression, with higher zones corresponding to higher estimated total serum bilirubin (TSB) levels.[4] Blood samples were taken for serum bilirubin estimation in neonates presenting with clinical jaundice.



DERMAL ZONE	MEAN SD	RANGE
1	5.9 ±0.3	4.3-7.9
2	8.9± 1.7	5.4-12.2
3	11.8± 1.8	8.1-12.2
4	15 ±1.7	11.1-18.3
5		>15

Figure 1: Jaundice categorized into 5 body zones by Karamer's rule

The sample size was calculated using standard statistical formulas (Figure 2) with an alpha error of 0.05, beta of 0.2, expected proportions (p1 = 0.6, p2 = 0.8), and a group ratio of 1:1. The minimum required sample size was determined to be 164.

$$n = \frac{[Z_{1-\alpha/2}\sqrt{\{(r+1)p(1-p)\}} + Z_{1-\beta}\sqrt{\{rp_1(1-p_1)+p_2(1-p_2)\}}]^2}{r(p_2-p_1)^2} \; ; \; p = \frac{p_1+p_2}{1+r}$$

Figure 2: Formula for sample size calculation

Data were recorded using a structured proforma and entered into Microsoft Excel for organization and coding. Statistical analysis was carried out using SPSS software version 21. Descriptive statistics were used to summarize the data. Categorical variables were expressed as frequencies and percentages. The chi-square test was employed to assess associations between categorical variables, with a p-value of <0.05 considered statistically significant.

Results

This study was carried out among 169 newborns admitted during the study period. Out of 169 neonates, 129 (76.3%) had neonatal jaundice while 40(23.7%) did not have neonatal jaundice. Most common risk factors for neonatal jaundice were sepsis (n=27, 20.9%) which was statistically significant. (Table1)

Table 1: Risk factor of neonatal hyperbilirubinemia

Risk factors	No of cases	Percentage	P value
Prematurity	43	33.3	0.313
Sepsis	27	20.9	0.001
ABO incompatibility	26	20.1	0.453
Perinatal asphyxia	12	9.3	0.506
Rh incompatibility	11	8.5	0.174
Cephalohematoma	5	3.8	0.68
Breastfeeding	5	3.8	0.206

In this study, there were 54 (32 %) were preterm and 115 (68 %) were term. Out of 113 male neonates, 87 (77%) had jaundice while 26 (23%) had no jaundice while in 56 female babies, 42 (75%) had neonatal jaundice while 14 (25%) did not have neonatal jaundice (table2).

Table 2: Gender distribution of admitted neonates

Gender	Jaundice present	Jaundice absent	Total
Male	87 (77%)	26 (23%)	113
Female	42 (75%)	14 (25%)	56
Total	129	40	169
Chi square(x2): 0.082		p value: 0.774	

Out of 54 preterm babies, 43 (79.6.7%) had jaundice and 11 (20.4%) had no jaundice. Out of 115 term babies 86 (74.8%) developed jaundice and 29 (25.2%) did not have jaundice. (Table 3)

Table 3: Distribution of hyperbilirubinemia according to gestational age

Gestational age	Jaundice present	Jaundice absent	Total
Preterm	43 (79.6%)	11 (20.4%)	54
Term	86 (74.8 %)	29 (25.2%)	115
Total	129	40	169
Chi square (x2): 0.478		p value: 0.313	

Discussion

In the present study, a significant proportion (78.3%) of neonates developed jaundice during the early neonatal period. These findings are consistent with those of Effiong et al.[5], who reported a jaundice prevalence of 72.4% in their cohort.

Among the neonates studied in this study, 79.6% of preterm and 74.8% of term babies developed jaundice; however, the association between gestational age and incidence of jaundice was not statistically significant. This aligns with findings from Fok et al., who also observed no significant correlation between prematurity and neonatal jaundice.[6]

Regarding birth asphyxia, 83.3% of neonates with an Apgar score <7 at 1 minute developed jaundice, while 16.7% did not. The association between low Apgar scores and jaundice was not statistically significant ($p = 0.460$), which is in agreement with a study by Zabeen et al., who reported that birth asphyxia was present in only a small proportion of cases without significant association.[7]

In neonates with ABO incompatibility, 78.8% developed jaundice, while 21.2% did not. However, the association between ABO incompatibility and neonatal jaundice was not statistically significant ($p = 0.69$), and this is consistent with findings from Michael Sgro et al.[8]

The limitation of this study was the inability to assess certain risk factors such as G6PD deficiency and pyruvate kinase deficiency due to limited diagnostic facilities. This may have led to underestimation of their role in neonatal jaundice.

Conclusion

This study found a high prevalence of neonatal hyperbilirubinemia among admitted neonates in the NICU and SCBU. Prematurity and neonatal sepsis emerged as leading contributors. Several clinical risk factors were identified, although not all showed a statistically significant association with jaundice. The findings underscore the importance of early recognition and timely management to prevent severe complications.

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