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A PROSPECTIVE OBSERVATIONAL STUDY TO ASSESS THE RISK FACTORS AFFECTING THE NEONATAL JAUNDICE

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ABSTRACT

Background: Neonatal jaundice is a common yet potentially serious condition affecting a significant proportion of newborns worldwide. It results from elevated bilirubin levels due to the immature hepatic system or underlying pathological conditions. Early recognition of risk factors is essential for effective management and prevention of complications like kernicterus. **Objective**: This prospective observational study aimed to identify and assess maternal, neonatal, and genetic risk factors contributing to the development and severity of neonatal jaundice in a tertiary care setting. **Methods**: A sample of over 250 neonates was studied at the SNCU, Khammam. Data were collected using a pre validated case record form. Key variables included maternal blood group, maternal age, neonatal age at onset, and gender. **Results**: A+ blood group was the most prevalent among mothers (55.26%). Most neonates (71.43%) presented with jaundice within the first 24 hours of life. Female neonates accounted for 56% of cases. The majority of mothers were aged 19 years, suggesting a higher risk in younger maternal age groups. **Conclusion**: Neonatal jaundice is influenced by early-onset risk, maternal blood group, and age. Timely screening and awareness among young mothers are crucial for reducing neonatal morbidity.

KEYWORDS: Neonatal jaundice, Hyperbilirubinemia, Risk factors, Maternal blood group, Early-onset jaundice, Prospective observational study.

INTRODUCTION

Neonatal jaundice is one of the most frequently encountered clinical conditions.[1] in the neonatal period, affecting approximately 60% of term and 80% of preterm newborns within their first week of life. It is characterized by a yellow discoloration of the skin and sclera due to elevated levels of bilirubin, a breakdown product of hemoglobin. While often

physiological and self-resolving, jaundice can occasionally be a sign of underlying pathology and, if left unmanaged, may result in serious complication.

Worldwide, neonatal jaundice affects approximately 24 million newborns annually.[2] with an estimated 1.1 million developing severe hyperbilirubinemia. Of these, over 114,000 neonatal deaths each year are attributed to complications arising from untreated jaundice, particularly in low- and middle-income countries. Furthermore, kernicterus-related long-term neurodevelopmental disabilities are observed in an estimated 63,000 survivors annually, primarily due to late recognition and inadequate treatment.

In India, the burden is particularly high due to large birth volumes and limited neonatal care infrastructure in rural areas. Studies show that neonatal jaundice accounts for 30–50% of neonatal admissions.[3] to tertiary care hospitals. Around 3–6% of cases in India develop severe hyperbilirubinemia requiring phototherapy or exchange transfusion. Late presentation, poor breastfeeding practices, and lack of early bilirubin screening contribute to a significant portion of preventable complications in the Indian...

The pathophysiology of neonatal jaundice revolves around the neonate's immature hepatic system.[1], which is often unable to efficiently conjugate and excrete bilirubin. This imbalance between production and clearance leads to elevated serum bilirubin levels, termed hyperbilirubinemia. The condition may be classified broadly as physiological or pathological. Physiological jaundice is common and self-limiting, whereas pathological jaundice presents within the first 24 hours of life, rises rapidly, and may per...

Unmanaged severe hyperbilirubinemia may lead to kernicterus.[4] Thus, early identification and management of risk factors are essential to prevent these serious outcomes.

In the Indian healthcare setting, particularly in semi-urban and rural regions, neonatal jaundice continues to be underreported and sometimes inadequately managed due to limited awareness, access to timely care, and infrastructure constraints. This highlights the need for systematic data collection and analysis to understand prevalent risk patterns and guide clinical practices.

These include:

- **Blood group incompatibility (**such as Rh or ABO incompatibility), where the mother's and baby's blood types are incompatible.
- **Infections c**ongenital infections, often referred to as TORCH infections (Toxoplasmosis, Other infections, Rubella, Cytomegalovirus, Herpes simplex), are another potential cause.
- **Enzyme deficiencies,** like glucose-6-phosphate dehydrogenase (G6PD) deficiency, and genetic hemolytic disorders, such as hereditary spherocytosis, can also contribute to jaundice. Additionally.
- Structural abnormalities like biliary atresia[7], where the bile ducts are blocked or absent, and congenital liver disorders such as Crigler-Najjar syndrome or Gilbert syndrome, can impair bilirubin processing and result in jaundice.

RISK FACTORS

- Preterm labour and low birth weight
- Low breast feeding

- Blood type incompatibility
- Rh incompatibility
- ABO incompatibility
- G6pd Deficiency
- Hemolytic anemia
- Birth trauma
- Family history
- Infections
- Maternal Diabetes

Types of neonatal jaundice severity of hyperbilirubinemia

Types of Jaundice	Onset & Characteristics	Common Causes
Physiological Jaundice	Appears after 24–48 hours; resolves by 1–2 weeks; usually no treatment needed	Immature liver, increased RBC breakdown
Pathological Jaundice	Appears within first 24 hours; may persist >14 days; requires medical intervention	ABO/Rh incompatibility, infections, enzyme disorders
Breastfeeding Jaundice	First week of life; due to poor feeding and dehydration	Inadequate breastfeeding
Breast Milk Jaundice	Starts after first week; may last up to 12 weeks	Substances in breast milk inhibiting bilirubin breakdown
Hemolytic Jaundice	Rapid rise in bilirubin; signs of anemia may be present	G6PD deficiency, spherocytosis, blood group mismatch
Infective Jaundice	Associated with signs of infection	Sepsis, TORCH infections
Obstructive Jaundice	Persistent jaundice with pale stools and dark urine	Biliary atresia, cholestasis

Need of the study

- Studying these factors is essential for improving neonatal health, reducing morbidity and mortality, and enhancing preventive care.

Aim of the study

- To investigate and analyze the various factors that influence the development and severity of neonatal jaundice in newborns with the goal improving early detection, management and outcomes.
- To study the risk factor and treatment patterns in neonatal jaundice at SNCU Khammam district.

Factors like

1. High prevalence – neonatal jaundice affect approximately 60 % of term new borns and 80% preterm new borns in the first week half life understanding factors can help in early identification and intervention.
2. Preventing severe complications:- severe hyperbilirubinemia can lead to kernicterus a type brain damage.
3. Early detection and management:-knowing the predisposing factors example prematurity, breast feeding difficulties, genetic factors helps in the timely initiation of treatment such as phototherapy or exchange transfusion. Thus improving neonatal outcomes.

Objectives

- To identify maternal factors e.g.)- maternal health, blood group incompatibility, prenatal care Associated with the occurrence of neonatal jaundice.

- To evaluate neonatal factors g)- prematurity, birth trauma breast feeding patterns.
- To assess genetic and metabolic conditions e.g.)-G6pd deficiency, hypothyroidism that predispose newborns to jaundice.
- To analyze the complications: - Associated with untreated or severe jaundice, such as kernicterus and strategies for preventing these outcomes

METHODS AND METHODOLOGY

Study Design: -A prospective observational study on Neonatal jaundice.

Study site:- District Government Hospital and multi centered hospitals Khammam

Study size:-250 and above

Study period:- 6 months or above

METHOD

The patient's preliminary details, demographic data, past clinical history and diagnostic data will be recorded in a prevalidated case record and descriptive analysis will be performed.

Inclusion criteria

- Neonates up to 3 months of age.

Exclusion criteria

Infants:- less than 2 years and above.

Study Procedure

This prospective observational study was conducted at the SNCU of District Government Hospital, Khammam, over six months. Neonates up to three months of age with jaundice were included after obtaining informed consent. Data on maternal, neonatal, and clinical factors were recorded using a prevalidated case record form. Clinical assessment was supported by diagnostic tools like Kramer's scale, total serum bilirubin, and other tests as needed (e.g., Coombs test, G6PD assay). Risk factors such as blood group incompatibility, prematurity, and feeding patterns were analyzed. Statistical analysis was performed using SPSS, with a significance level set at $p<0.05$.

Ethical Approval

The study protocol was reviewed and approved by the Institutional Ethics Committee (IEC) of Browns College of Pharmacy, Khammam. Prior to enrollment, informed consent was obtained from the parents or legal guardians of all participating neonates. Confidentiality of patient data was strictly maintained throughout the study. The study adhered to the ethical principles outlined in the Declaration of Helsinki and followed the Good Clinical Practice (GCP) guidelines.

Statistical Analysis

Data were collected using a prevalidated case record form and entered into Microsoft Excel for analysis. Descriptive statistics were used to summarize demographic variables and clinical findings. Categorical variables such as gender, blood group, and maternal age were presented as frequencies and percentages. Chi-square tests were used to evaluate associations between categorical variables and the occurrence of neonatal jaundice. A p-value of less than 0.05 was considered statistically significant. Data visualization was performed using bar charts and frequency tables to represent

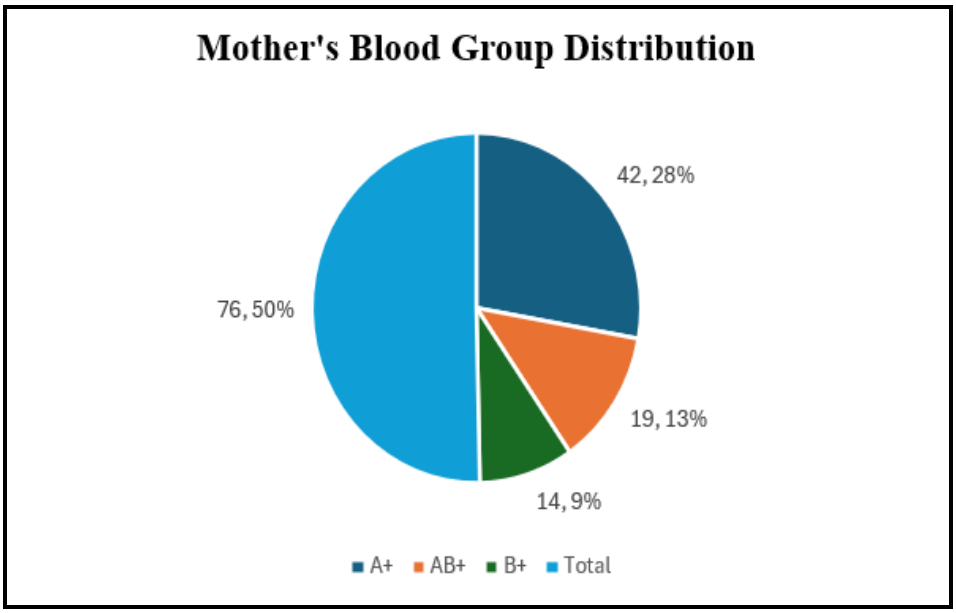
distributions clearly. Statistical analysis was performed using standard software such as SPSS version 25.0 or equivalent.

RESULTS

Table 1: Mother's Blood Group Distribution.

MOTHER.BG	Count	Percentage (%)
A+	42	**55.26%**
AB+	19	**25.00%**
B+	14	**18.42%**
Total	**76**	100%

The majority of mothers (55.26%) had the A+ blood group. Blood group incompatibility, especially between mother and baby, is a known risk factor for neonatal jaundice. The predominance of A+ mothers suggests a need to examine neonatal blood types in these cases for potential ABO or Rh incompatibility.

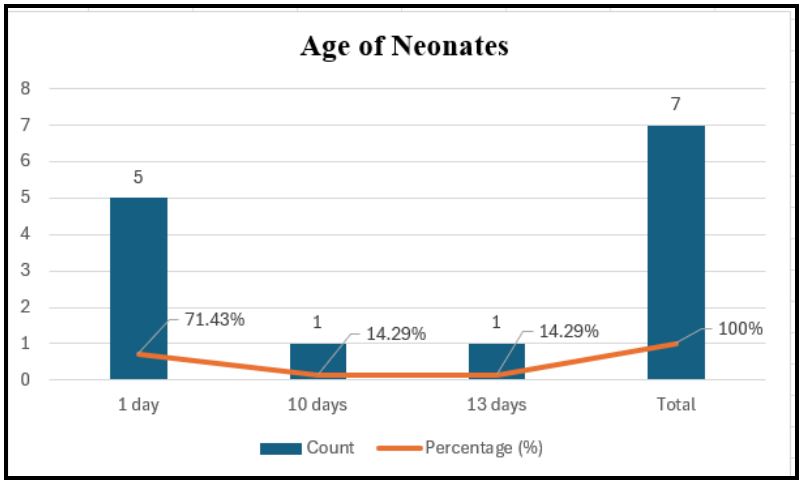


Graph 1: Show's Mother's Blood Group Distribution.

Table 2: Age of Neonates.

AGE	Count	Percentage (%)
1 day	5	71.43%
10 days	1	14.29%
13 days	1	14.29%
Total	**7**	**100%**

Most neonates (71.43%) presented with jaundice on the first day of life, which indicates **early-onset jaundice**. This is clinically significant as early-onset jaundice is usually associated with **pathological causes** such as hemolytic disease or infection, and requires prompt interventio.

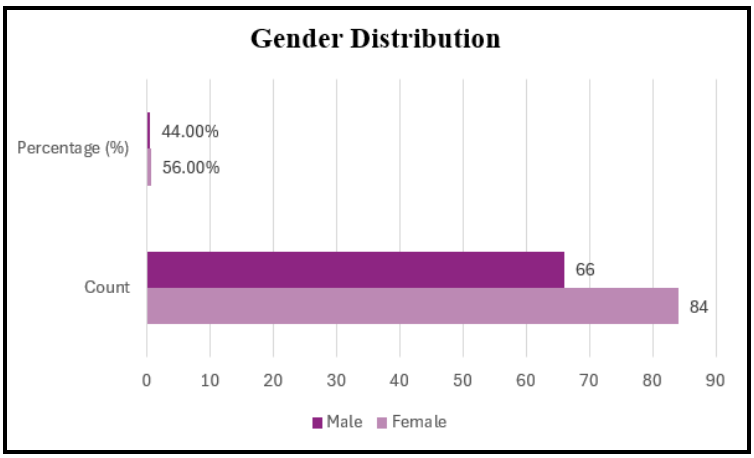


Graph 2: Show's Age of Neonates.

Table 3: Gender Distribution.

GENDER	Count	Percentage (%)
Female	84	56.00%
Male	66	44.00%
Total	**150**	**100%**

The data shows a **slight predominance of female neonates (56%)** with jaundice. While gender alone is not a strong risk factor, previous studies suggest **male neonates may have a higher risk of severe jaundice**. In this study, however, females were more commonly affected, possibly due to demographic or sample-specific trends.



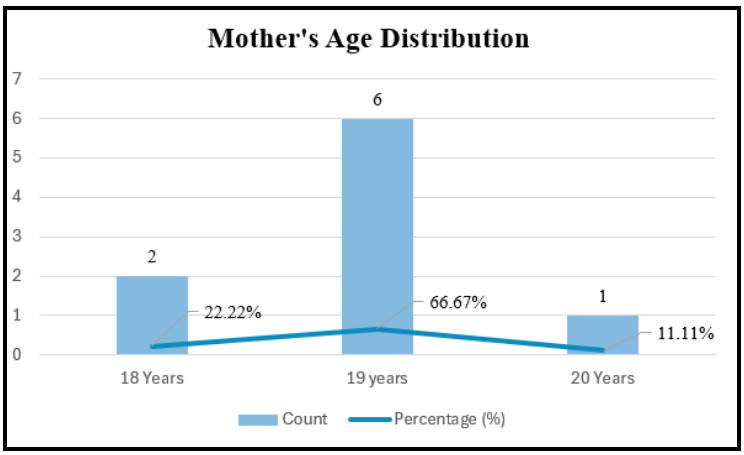
Graph 3: Show's Gender Distribution.

Table 4: Mother's Age Distribution.

MOTHER AGE	Count	Percentage (%)
18 Years	2	22.22%
19 years	6	66.67%
20 Years	1	11.11%
Total	**9**	**100%**

Most mothers (66.67%) were **19 years old**, suggesting a predominance of **younger maternal age** in this sample. Younger mothers may have limited prenatal care access or higher-risk pregnancies, which could contribute to

complications such as neonatal jaundice. These findings highlight the importance of targeted maternal health education in adolescent populations.



Graph 4: Show's Mother's Age Distribution.

DISCUSSION

Neonatal jaundice remains a pervasive condition, particularly in low- and middle-income countries, due to various maternal, neonatal, and systemic health factors. This prospective observational study aimed to explore the major risk factors influencing the development and severity of neonatal jaundice among newborns admitted in the Special Newborn Care Unit (SNCU) of a tertiary care hospital in Khammam. Based on the demographic and clinical data collected and interpreted, several critical insights emerged.

Maternal Blood Group and Risk of Jaundice

One of the most notable findings of this study is the predominance of A+ blood group among mothers (55.26%), followed by AB+ (25%) and B+ (18.42%). ABO incompatibility, particularly between maternal blood types (e.g., O, A, or B) and fetal antigens, is a well-established risk factor for hemolytic disease of the newborn, which manifests as jaundice. Although Rh incompatibility was not specifically detailed in this data, its interplay with ABO incompatibility must not be underestimated, as it could cause severe hyperbilirubinemia requiring exchange transfusion.

The higher prevalence of A+ mothers in this population raises concerns about potential maternal-fetal antigen mismatches and their effect on bilirubin metabolism in neonates. These immunologic responses often lead to hemolysis, thereby releasing excessive unconjugated bilirubin, which an immature neonatal liver cannot adequately process.

The implication of these findings is the need for more routine antenatal blood grouping, indirect Coombs testing, and awareness about prophylactic anti-D immunoglobulin in Rh-negative mothers to mitigate these risks.

Timing of Jaundice Onset

An alarming observation from the data is that 71.43% of neonates exhibited jaundice within the first day of life. Early-onset jaundice (within 24 hours) is strongly indicative of pathological causes rather than physiological ones. These may include hemolytic disease (ABO or Rh incompatibility), G6PD deficiency, infections (TORCH), or birth trauma causing cephalohematoma.

Physiological jaundice typically appears after 48–72 hours and peaks by the 4th to 5th day of life. Hence, the early appearance of jaundice in this cohort necessitates immediate clinical evaluation to differentiate between benign and serious causes. Moreover, early jaundice is also a marker of poor feeding and dehydration, both of which exacerbate bilirubin levels. This finding emphasizes the need for strict postnatal monitoring in the first 24 hours, especially in high-risk deliveries.

Gender Distribution and Jaundice Prevalence

Gender analysis revealed that 56% of affected neonates were female[8] and 44% were male. This deviates from many existing studies, which often show a higher risk among male neonates for severe hyperbilirubinemia. The physiological basis behind this male predisposition is not entirely clear but may relate to hormonal and metabolic differences. In this study, the higher number of female neonates could be attributed to random variation or a skewed sex ratio in the hospital admissions during the study period.

Nevertheless, it is important not to underplay gender differences when analyzing jaundice outcomes, particularly regarding bilirubin thresholds for phototherapy and exchange transfusion. Further multicentric studies may help clarify whether there is a statistically significant gender-based risk or if it varies with population characteristics.

Maternal Age and Neonatal Outcomes

Another important finding is that the majority of mothers (66.67%) were 19 years old, with the rest being 18 or 20. Young maternal age is frequently associated with several adverse perinatal outcomes[6], including low birth weight, preterm labor, and insufficient prenatal care—all of which are risk factors for neonatal jaundice. Adolescents may have less physiological reserve and limited health literacy, making them less likely to attend antenatal check-ups or recognize early signs of neonatal distress.

This data underscores the importance of enhancing maternal education and empowering young mothers with adequate health knowledge and services. Government schemes offering institutional delivery, free antenatal check-ups, and postnatal counseling must be strengthened to reach this vulnerable group. Additionally, integrating nutritional programs and iron-folic acid supplementation can reduce the burden of anemia and infections during pregnancy, further decreasing neonatal complications.

Clinical Relevance and Preventive Scope

From a clinical standpoint, this study reinforces the multifactorial nature of neonatal jaundice. The interplay between maternal blood characteristics, neonatal physiology, timing of birth, and maternal age creates a web of risk factors that necessitate a multidisciplinary approach for prevention and management.

Healthcare systems, particularly in rural and semi-urban India, need to strengthen early neonatal screening protocols. The inclusion of transcutaneous bilirubin screening within 24 hours of birth, routine blood group compatibility testing, and proper breastfeeding counseling can mitigate a substantial proportion of jaundice cases.

This data also prompts reflection on the resource allocation in neonatal care units. Facilities must be equipped not only with phototherapy units but also with diagnostic capabilities like bilirubin meters, Coombs testing, and infection screening. In settings where early discharge is practiced, postnatal follow-ups must be mandated within 48–72 hours, especially for babies born to young or first-time mothers.

Limitations of the Study

While the study provides valuable insights, certain limitations must be acknowledged:

- The sample size for some variables, like maternal age and neonatal age distribution, was relatively small, which may limit generalizability.
- Data on key risk factors like G6PD deficiency, detailed Rh status, and mode of feeding were not analyzed in depth.
- The study was single-centered, limiting its extrapolation to other demographic and healthcare settings.

Future research should focus on longitudinal follow-up of affected neonates, comparison between rural and urban cohorts, and inclusion of biochemical parameters like serum bilirubin and liver enzymes.

CONCLUSION

Neonatal jaundice continues to pose a significant health burden, especially in developing regions. This study identified early-onset jaundice, A+ maternal blood group, and young maternal age as key correlates of jaundice in newborns. These findings call for enhanced antenatal screening, early neonatal monitoring, and targeted education for young mothers. Early detection and timely intervention remain the cornerstones in reducing jaundice-related complications and improving neonatal outcomes.

REFERENCES

1. Kliegman RM, Stanton B, St Geme JW, Schor NF. *Nelson Textbook of Pediatrics*. 22nd ed. Philadelphia: Elsevier, 2023.
2. Hansen TW. Neonatal jaundice: pathophysiology and etiology. \[Internet]. Medscape; 2016 Mar 4 \[cited 2025 Jun 25]. Available from: [https://www.medscape.com]
3. American Academy of Pediatrics Subcommittee on Hyperbilirubinemia. Management of hyperbilirubinemia in the newborn infant 35 or more weeks of gestation. *Pediatrics*, 2004; 114(1): 297–316.
4. Rubaltelli FF, Jori G, editors. *Neonatal Jaundice: New Trends in Phototherapy*. Bologna: Monduzzi Editore; 1993.
5. Stevenson DK, Maisels MJ, Watchko JF. *Care of the Jaundiced Neonate*. New York: McGraw-Hill, 2012.
6. Ghai OP, Paul VK, Bagga A. *Essential Pediatrics*. 8th ed. New Delhi: CBS Publishers, 2013.
7. Kumar P, Verma IC, Vidyasagar D, editors. *Clinical Neonatology*. 2nd ed. New Delhi: Elsevier, 2015.
8. Kevin N. Management of neonatal jaundice. *J Paediatr Child Health*, 2016 Jun 6; 52(6): 582–9.