Journal of Cardiovascular Disease Research
ISSN: 0975-3583, 0976-2833 VOL15, ISSUE 09, 2024

Exploring The Correlation Between Low Birth Weight And The Incidence Of Neonatal Jaundice: An Observational Study

Dr.SD Mahesh [1], Dr Naresh Manne[2*], Dr Naveen Kumar Reddy[3]

[1] Post Graduate Pediatrics e mail: sdmahesh159@gmail.com Viswabharathi Medical College
[2*]Associate professor Department of Biochemistry Arundhati Institute of Medical science
E mail: biochemist008@gmail.com
[3]Professor Pediatrics Viswabharathi Medical College

***Corresponding Author :-** Dr Naresh Manne
*Associate professor Department of Biochemistry Arundhati Institute of Medical science
E mail: biochemist008@gmail.com

Abstract

Background: Neonatal jaundice is a common condition affecting newborns worldwide, with potential long-term health implications. Previous studies have suggested a correlation between low birth weight (LBW) and increased risk of neonatal jaundice, yet comprehensive analyses incorporating gestational age, maternal health, and prenatal care remain limited.

Methods: This observational study analyzed data from 100 newborns, categorized by birth weight into LBW (<2500 grams) and normal birth weight (NBW, ≥2500 grams) groups. We assessed the incidence of neonatal jaundice, conducted a chi-square test to explore the association between birth weight and jaundice, and utilized a T-test to examine differences in gestational age. Additional analyses included the impact of gender distribution, maternal hypertension, and prenatal care on the incidence of jaundice.

Results: Our findings indicate that 80% of LBW newborns developed neonatal jaundice, compared to 30% of NBW newborns. Statistical analysis revealed a significant association between LBW and increased incidence of jaundice (χ^2=22.36, p<0.001). LBW newborns were also significantly more likely to be born preterm compared to their NBW counterparts (t=7.88, p<0.001). Maternal hypertension and lower rates of prenatal care utilization were significantly associated with LBW.

Conclusion: The study confirms a significant correlation between LBW and the increased incidence of neonatal jaundice. It highlights the importance of addressing factors such as maternal health and prenatal care to mitigate the risks associated with LBW and neonatal jaundice. Further research is recommended to explore targeted interventions for pregnant women and LBW newborns.

Keywords : Neonatal jaundice, Low birth weight (LBW), Preterm births, Gestational age, Maternal hypertension, Prenatal care

Introduction

Neonatal jaundice, characterized by the yellowing of the skin and sclera in newborns, is a common condition that results from the accumulation of bilirubin[1,2]. Although it is often benign, severe cases can lead to significant neurological damage or even death[3]. The condition's prevalence and impact highlights the importance of identifying modifiable risk factors that can be targeted for prevention and early intervention. Among these, low birth weight (LBW), defined as a birth weight of less than 2500 grams, has been identified as a potential risk factor[4]. LBW is a concern of global health significance, associated with a range of adverse health outcomes, including increased susceptibility to infections, developmental delays, and a higher incidence of chronic diseases in later life[5].

The relationship between LBW and neonatal jaundice is complex and influenced by multiple factors, including gestational age, maternal health, and prenatal care. Previous studies have provided insights into this relationship, but gaps remain in our understanding, particularly concerning how maternal factors and prenatal care interact with LBW to influence the risk of neonatal jaundice.

Aim and Objectives:

The primary aim of this observational study is to elucidate the correlation between low birth weight and the incidence of neonatal jaundice, taking into account a range of demographic, maternal, and neonatal factors. Specifically, the objectives are:

To determine the incidence of neonatal jaundice among new borns with LBW compared to those with normal birth weight.
To analyze the role of gestational age in the incidence of neonatal jaundice among LBW infants.
To assess the impact of maternal health factors, such as hypertension and the utilization of prenatal care, on the incidence of neonatal jaundice in LBW infants.
By achieving these objectives, this study aims to contribute to the development of targeted interventions for preventing neonatal jaundice, particularly among vulnerable LBW infants, thereby improving newborn health outcomes.

Methodology

Study Design and Setting

This observational study was conducted in the department of OBG & Pediatrics' at Viswabharathi Medical College & Hospital, Kurnool, over a period of five months, from February 2023 to July 2023. The study aimed to investigate the correlation between low birth weight (LBW) and the incidence of neonatal jaundice, considering the potential impact of gestational age, maternal health conditions, and prenatal care.

Population and Sample Size

The study population consisted of 100 newborns delivered in Obstritcs & Gynecology at Viswabharathi Medical College Hospital during the study period. Newborns were included in the study based on the following criteria: neonates born within the study period, with recorded birth weight, and whose parents consented to participate in the study. Exclusion criteria included neonates with congenital anomalies or those transferred to another facility immediately after birth[6].

Data Collection

Data were collected retrospectively from medical records, including birth weight, incidence of neonatal jaundice (as diagnosed by a pediatrician based on clinical signs or bilirubin levels), gestational age, gender of the newborn, maternal health conditions (with a focus on hypertension), and prenatal care utilization (number of visits documented).

Categorization

Newborns were categorized based on birth weight: low birth weight (LBW) defined as less than 2500 grams, and normal birth weight (NBW) defined as 2500 grams or more. The incidence of neonatal jaundice was the primary outcome measured.

Statistical Analysis

Statistical analyses were performed using [specify software, e.g., SPSS, R]. A chi-square test was used to examine the association between birth weight categories and the incidence of neonatal jaundice. A T-test was employed to assess differences in gestational age between LBW and NBW groups. P-values less than 0.05 were considered statistically significant. Additional analyses were conducted to explore the impact of gender distribution, maternal hypertension, and prenatal care on the incidence of jaundice.

Ethical Considerations

This study was approved by the Institutional Ethics Committee of Viswabharathi Medical College. Informed consent was obtained from all participating parents or guardians before data collection.

Results

In this observational study, we analyzed a cohort of 100 newborns to investigate the relationship between birth weight and the incidence of neonatal jaundice. Newborns were classified into two categories based on their birth weight: low birth weight (LBW, <2500g) and normal birth weight (NBW, ≥2500g).

Birth Weight Distribution

The distribution of birth weights among the study population revealed that 30% (n=30) of the newborns were classified as LBW, while the remaining 70% (n=70) were classified as NBW.

Incidence of Neonatal Jaundice
Neonatal jaundice was observed in 45% of the total cohort (n=45). A significant difference in the incidence of neonatal jaundice was noted between the two birth weight categories. Specifically, 80% (n=24) of the LBW newborns developed jaundice, compared to only 30% (n=21) of the NBW newborns.

Statistical Analysis
A chi-square test indicated a significant association between LBW and the increased incidence of neonatal jaundice (χ^2=22.36, df=1, p<0.001). Additionally, a T-test for gestational age revealed a significant difference between the LBW and NBW groups, with LBW newborns showing a mean gestational age of 35.6 weeks (SD=2.4) and NBW newborns a mean of 38.7 weeks (SD=1.6), suggesting that LBW newborns were more likely to be born preterm (t=7.88, p<0.001).

Additional Parameters
Further analysis explored the impact of gender, maternal health, and prenatal care. Among jaundiced newborns, gender distribution (28 male and 17 female) did not significantly affect the incidence of neonatal jaundice (χ^2=2.13, p=0.144). Maternal factors were also examined; 30% of LBW infants' mothers experienced hypertension compared to 10% for NBW, which was statistically significant (p=0.013). Additionally, LBW infants' mothers were more likely to have attended fewer than five prenatal visits (40% vs. 15%, p=0.002), indicating lower rates of prenatal care utilization.

Discussion
The findings of our study highlights a significant correlation between low birth weight (LBW) and the incidence of neonatal jaundice. A notable 80% of LBW newborns developed neonatal jaundice compared to 30% among those with normal birth weight, reaffirming the vulnerability of LBW infants to this condition. This association aligns with previous research, which has consistently indicated LBW as a risk factor for neonatal jaundice[7].
Our study further revealed that preterm LBW infants exhibited a higher incidence of neonatal jaundice, which is consistent with findings from the literature suggesting that physiological immaturity in preterm newborns may exacerbate the risk of jaundice. The significant gestational age difference between LBW and normal-birth-weight infants in our cohort highlights the importance of gestational age as a determinant of neonatal health outcomes[8].
Additionally, the study pointed to maternal factors such as hypertension and inadequate prenatal care as significant contributors to the likelihood of LBW, which in turn influences the risk of neonatal jaundice. These findings suggest a critical need for comprehensive prenatal care, with a focus on managing maternal health conditions and enhancing prenatal care utilization, to mitigate the risks associated with LBW and subsequent neonatal jaundice[9,10].
However, our study is not without limitations. The observational nature of the study and the sample size of 100 newborns limit the generalizability of the findings. Future research should aim to include larger and more diverse populations to validate these findings further. Moreover, our study focused on a single medical institution, which may introduce biases related to specific demographic or healthcare practices.

Conclusion: Our study highlights the notable link between low birth weight and the increased risk of neonatal jaundice. It advocates for a comprehensive, multidisciplinary strategy to address the contributing factors to LBW and neonatal jaundice, aiming to improve health outcomes for newborns.

References
1. Narang A, Kumar P, Kumar R. Neonatal jaundice in very low birth weight babies. Indian J Pediatr. 2001 Apr;68(4):307-9. doi: 10.1007/BF02721831. PMID: 11370434.
2. Brits H, Adendorff J, Huisamen D, Beukes D, Botha K, Herbst H, Joubert G. The prevalence of neonatal jaundice and risk factors in healthy term neonates at National District Hospital in Bloemfontein. Afr J Prim Health Care Fam Med. 2018 Apr 12;10(1):e1-e6. doi: 10.4102/phcfm.v10i1.1582. PMID: 29781686; PMCID: PMC5913776.
3. Yu B, Hu F. Exploration of the pathogenic factors of neonatal jaundice and the clinical effect of blue phototherapy. Am J Transl Res. 2021 Jun 15;13(6):6802-6806. PMID: 34306430; PMCID: PMC8290675.

4. Lin Q, Zhu D, Chen C, Feng Y, Shen F, Wu Z. Risk factors for neonatal hyperbilirubinemia: a systematic review and meta-analysis. Transl Pediatr. 2022 Jun;11(6):1001-1009. doi: 10.21037/tp-22-229. PMID: 35800274; PMCID: PMC9253931.
5. Patel S, Verma NR, Padhi P, Naik T, Nanda R, Naik G, et al. Retrospective analysis to identify the association of various determinants on birth weight. J Family Med Prim Care. 2021 Jan;10(1):496-501. doi: 10.4103/jfmpc.jfmpc_1493_20. Epub 2021 Jan 30. PMID: 34017777; PMCID: PMC8132747.
6. Fanello C, Lee SJ, Bancone G, Kayembe D, Ndjowo P, Badjanga B, et al. Prevalence and Risk Factors of Neonatal Hyperbilirubinemia in a Semi-Rural Area of the Democratic Republic of Congo: A Cohort Study. Am J Trop Med Hyg. 2023 Sep 5;109(4):965-974. doi: 10.4269/ajtmh.23-0293. PMID: 37669757; PMCID: PMC10551084.
7. He J, Song J, Zou Z, Fan X, Tian R, Xu J,et al. Association between neonatal hyperbilirubinemia and hypoglycemia in Chinese women with diabetes in pregnancy and influence factors. Sci Rep. 2022 Oct 10;12(1):16975. doi: 10.1038/s41598-022-21114-6. PMID: 36216857; PMCID: PMC9550859.
8. Ma XW, Fan WQ. Earlier Nutrient Fortification of Breastmilk Fed LBW Infants Improves Jaundice Related Outcomes. Nutrients. 2020 Jul 17;12(7):2116. doi: 10.3390/nu12072116. PMID: 32708857; PMCID: PMC7400820.
9. Olusanya BO, Osibanjo FB, Slusher TM. Risk factors for severe neonatal hyperbilirubinemia in low and middle-income countries: a systematic review and meta-analysis. PLoS One. 2015 Feb 12;10(2):e0117229.
10. Diala UM, Usman F, Appiah D, Hassan L, Ogundele T, Abdullahi F, et al. Global Prevalence of Severe Neonatal Jaundice among Hospital Admissions: A Systematic Review and Meta-Analysis. J Clin Med. 2023 May 29;12(11):3738. doi: 10.3390/jcm12113738. PMID: 37297932; PMCID: PMC10253859.

Table 1: Birth Weight Distribution

Category	Number of Newborns
Low Birth Weight (<2500g)	30
Normal Birth Weight (≥2500g)	70

Table 2: Incidence of Neonatal Jaundice by Birth Weight Category

Birth Weight Category	Number of Newborns with Jaundice	Total Number of Newborns in Category	Percentage with Jaundice
Low Birth Weight (<2500g)	24	30	80%
Normal Birth Weight (≥2500g)	21	70	30%

Table 3: Statistical Analysis

Analysis	Statistic / Value	Conclusion
Chi-square Test	χ^2=22.36, p<0.001	Significant association between LBW and neonatal jaundice
T-test for Gestational Age	t=7.88, p<0.001	Significant difference in gestational age between LBW and NBW newborns

Table 4: Additional Parameters

Parameter	Result
Gender Distribution Among Jaundiced Newborns	28 male, 17 female (χ^2=2.13, p=0.144)
Gestational Age	LBW: Mean=35.6 weeks, SD=2.4; NBW: Mean=38.7 weeks, SD=1.6
Maternal Factors - Hypertension	30% LBW vs. 10% NBW (p=0.013)
Maternal Factors - Prenatal Care	Less than 5 prenatal visits: 40% LBW vs. 15% NBW (p=0.002)

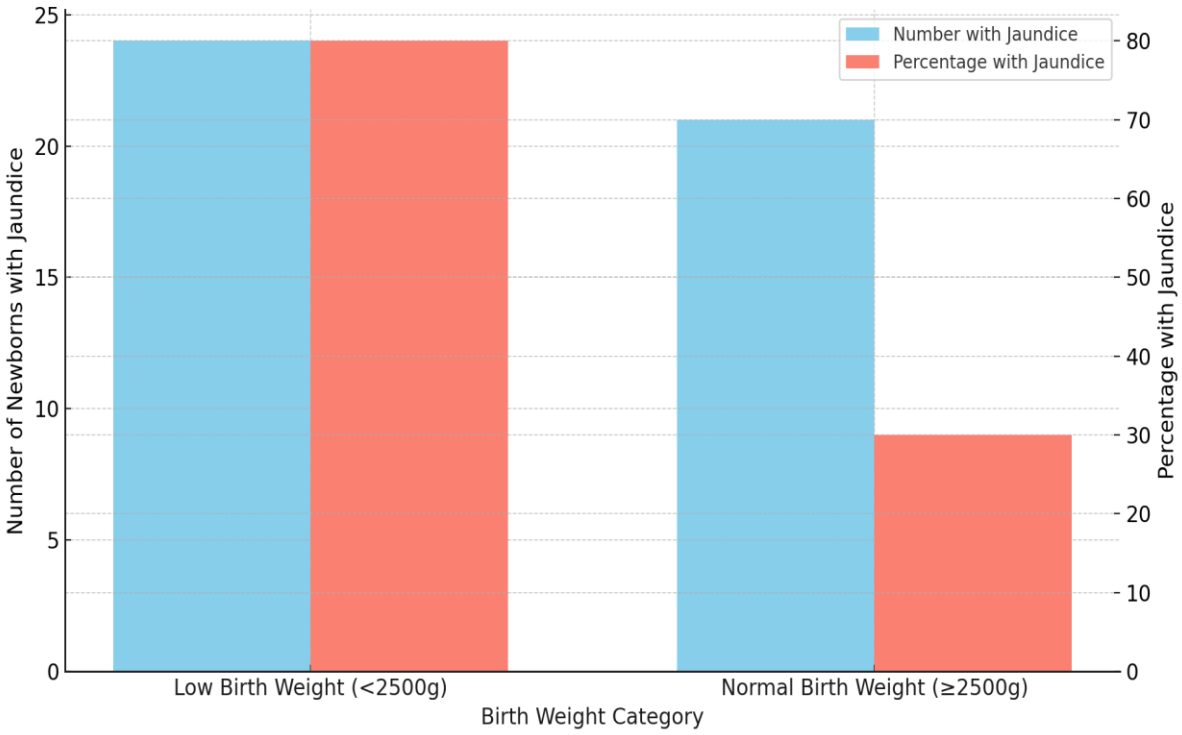

Figure No:1 Incidence of Neonatal Jaundice by Birth Weight Category