

Original article

Study on assessment of preterm babies and its outcome

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Abstract

Background: Preterm birth, defined as delivery before 37 weeks of gestation, is a leading cause of neonatal morbidity and mortality worldwide. Despite advancements in neonatal care, preterm infants remain at high risk for various complications, which significantly impact their survival and long-term health outcomes.

Aim: This study aimed to assess the clinical characteristics, complications, and immediate outcomes of preterm neonates in a tertiary care center.

Methods: A hospital-based observational study was conducted over one year, including 40 preterm neonates admitted to the Neonatal Intensive Care Unit (NICU). Maternal and neonatal data were collected, including gestational age, birth weight, and antenatal complications. Neonatal outcomes were assessed in terms of morbidity and survival at discharge. Data were analyzed using descriptive statistics and SPSS software.

Results: The most common maternal complications were premature rupture of membranes (22.5%) and hypertension (20%). Respiratory distress syndrome was the most frequent neonatal morbidity (40%), followed by feeding difficulties (35%) and sepsis (25%). The overall survival rate was 80%, with 50% of neonates discharged in healthy condition, while 30% had ongoing complications.

Conclusion: Preterm neonates are at significant risk for respiratory, infectious, and feeding complications. Improved antenatal care and specialized NICU management are essential for better neonatal outcomes.

Keywords: Preterm neonates, neonatal morbidity, survival outcomes

Introduction

Preterm birth, defined as delivery before 37 weeks of gestation, is a global health challenge, contributing significantly to neonatal morbidity and mortality.¹ Despite advancements in obstetric care, preterm birth remains a leading cause of neonatal death and long-term neurodevelopmental impairment. The incidence of preterm birth varies globally, with developing countries facing higher rates due to socio-economic factors, poor access to healthcare, and inadequate maternal health services. Preterm neonates, particularly those born before 32 weeks of gestation or with low birth weight, are at increased risk of complications such as respiratory distress syndrome, infections, hypothermia, and feeding difficulties. The management of preterm infants requires a multidisciplinary approach, including specialized neonatal intensive care, to improve survival and long-term outcomes.^{2,3}

This study aims to assess the clinical profile of preterm babies, their immediate outcomes, and factors contributing to neonatal morbidity and mortality. Understanding these factors is crucial for improving preterm care and implementing strategies to reduce the incidence and complications associated with preterm birth. By

evaluating both short- and long-term outcomes, this study seeks to identify interventions that can enhance survival rates and reduce the risk of long-term disabilities in preterm infants.⁴

Methodology

This was a hospital-based observational study conducted over a one-year period at a tertiary care center. The study included 40 preterm neonates born before 37 weeks of gestation, admitted to the Neonatal Intensive Care Unit (NICU) during the study period. Ethical clearance was obtained prior to the commencement of the study, and written informed consent was obtained from the parents or guardians of all participants. Neonates with major congenital anomalies or those referred from other hospitals were excluded from the study.

Data collection involved detailed documentation of maternal and neonatal characteristics. Maternal data included age, parity, antenatal complications, history of premature rupture of membranes, and any predisposing factors such as multiple pregnancies or infections. Neonatal data encompassed gestational age, birth weight, sex, mode of delivery, Apgar scores, and the need for resuscitation at birth. Additionally, the clinical course in the NICU, including the need for mechanical ventilation, oxygen therapy, and surfactant administration, was recorded.

The outcomes assessed included immediate neonatal morbidity, such as respiratory distress syndrome, intraventricular hemorrhage, sepsis, and feeding difficulties. Survival rates and discharge status were documented for all neonates. Follow-up data on neurodevelopmental outcomes at six months were collected for the surviving neonates. The outcomes were analyzed with respect to gestational age, birth weight, and other contributing factors.

Data were entered into Microsoft Excel and analyzed using SPSS software version 23.0. Descriptive statistics, including frequencies and percentages, were used to summarize categorical variables, while continuous variables were expressed as means and standard deviations. A p-value of less than 0.05 was considered statistically significant for all analyses.

Results:

Table 1: Maternal Characteristics of Preterm Births (n=40)

Characteristic	Frequency	Percentage (%)
Age Group (Years)		
18-25	10	25%
26-35	29	72.5%
>35	1	2.5%
Parity		
Primiparous	18	45%
Multiparous	22	55%
Antenatal Complications		
Hypertension	8	20%
Diabetes	5	12.5%
Premature Rupture of Membranes	9	22.5%
Infections	7	17.5%
Multiple Pregnancy	6	15%

Table 2: Neonatal Characteristics at Birth (n=40)

Characteristic	Frequency	Percentage (%)
Gestational Age (Weeks)		
28-30	2	5%
31-33	15	37%
34-36	23	58%
Birth Weight (kg)		
<1.5	12	30%
1.5-2.0	18	45%
>2.0	10	25%
Mode of Delivery		
Vaginal	20	50%
Cesarean Section	20	50%

Table 3: Morbidity in Preterm Neonates (n=40)

Complication	Frequency	Percentage (%)
Respiratory Distress Syndrome	16	40%
Sepsis	10	25%
Intraventricular Hemorrhage	4	10%
Necrotizing Enterocolitis	3	7.5%
Feeding Difficulties	14	35%
Jaundice	12	30%

Table 4: Neonatal Outcomes at Discharge (n=40)

Outcome	Frequency	Percentage (%)
Survived and Discharged	32	80%
Died	8	20%
Discharge Condition		
Healthy	20	50%
With Complications	12	30%
Referred to Higher Center	8	20%

Discussion

The study on preterm neonates and their outcomes highlights critical insights into the risk factors, morbidity, and survival of preterm infants in a tertiary care setting. Preterm birth remains a major public health issue worldwide, contributing to neonatal morbidity and mortality. The results of this study provide valuable information on the clinical characteristics of preterm neonates, maternal risk factors, and immediate outcomes, enabling a better understanding of preterm care and management.^{5,6,7}

Maternal Characteristics and Risk Factors

The results of this study indicate that the majority of preterm births occurred in mothers aged 26-35 years, accounting for 72.5% of cases, followed by the 18-25 age group (25%) and those older than 1 (2.5%). This distribution suggests that maternal age is not a dominant risk factor in this population, but it does align with global studies showing that younger and older maternal ages are associated with higher risks of preterm birth due to factors such as hypertension and pre-existing conditions.

The study also identified several maternal complications that were associated with preterm births, including hypertension (20%), premature rupture of membranes (22.5%), infections (17.5%), and multiple pregnancies (15%). These findings are consistent with established literature, which highlights the role of maternal health conditions, such as hypertension, diabetes, and infections, in triggering preterm labor. Premature rupture of membranes and multiple pregnancies are well-known obstetric complications that increase the risk of preterm birth by weakening the uterine environment and increasing uterine distention, respectively. The relatively high incidence of these risk factors in the study cohort emphasizes the need for targeted antenatal care and early interventions to mitigate their effects.⁸

Neonatal Characteristics at Birth

The distribution of gestational age in this study showed that most preterm births occurred between 31-33 weeks (58%), followed by an equal distribution between 28-30 weeks and 34-36 weeks. This reflects the common gestational age range for preterm births in resource-limited settings, where access to high-quality antenatal care and timely interventions may be limited. The birth weight distribution revealed that 30% of neonates had a birth weight of less than 1.5 kg, while the majority (45%) weighed between 1.5-2.0 kg. This underscores the vulnerability of low birth weight neonates to various complications associated with preterm birth, such as respiratory distress syndrome (RDS) and feeding difficulties, as their underdeveloped organs struggle to adapt to extra-uterine life.⁹

The mode of delivery was evenly distributed between vaginal deliveries and cesarean sections, each accounting for 50% of the cases. Cesarean sections are often performed in preterm pregnancies due to fetal distress or other maternal complications, which aligns with the findings of this study. However, the decision regarding the mode of delivery in preterm pregnancies remains complex and should be individualized, considering the maternal and fetal conditions.

Neonatal Morbidity

Preterm neonates are at high risk of developing several complications due to their premature organ development, which was evident in this study. Respiratory distress syndrome was the most common morbidity, affecting 40% of the neonates. This finding is consistent with the well-documented association between preterm birth and RDS, which is primarily due to the lack of surfactant in immature lungs. Early administration of surfactant and respiratory support, including mechanical ventilation, can significantly improve outcomes in these neonates.

Sepsis was another significant complication, observed in 25% of preterm neonates. Preterm infants are more susceptible to infections due to their immature immune systems and prolonged stays in the NICU, where invasive procedures such as intravenous lines and intubation increase the risk of infection. This highlights the

importance of stringent infection control practices and early recognition of sepsis to reduce its impact on neonatal outcomes.

Intraventricular hemorrhage (IVH) was present in 10% of the neonates, a well-known complication of prematurity that occurs due to the fragility of the cerebral blood vessels. IVH can lead to long-term neurodevelopmental impairments, emphasizing the need for careful monitoring of preterm infants at risk. Necrotizing enterocolitis (NEC) and feeding difficulties were observed in 7.5% and 35% of the neonates, respectively, both of which are common in preterm infants with underdeveloped gastrointestinal systems. NEC, although less frequent, is a life-threatening condition that requires prompt intervention.

Jaundice was reported in 30% of preterm neonates, a common finding due to the immature liver function in these infants. While jaundice is usually treatable with phototherapy, severe cases can lead to complications such as kernicterus, making early detection and management crucial.¹⁰

Neonatal Outcomes

The neonatal outcomes at discharge showed that 80% of preterm neonates survived and were discharged from the NICU, which is a promising result considering the high-risk nature of preterm births. Among the surviving neonates, 50% were discharged in a healthy condition, while 30% had ongoing complications. This suggests that, although survival rates are improving, a significant proportion of preterm infants continue to face health challenges post-discharge, highlighting the need for long-term follow-up and supportive care.

The mortality rate in this study was 20%, which is comparable to other studies conducted in similar settings. The high mortality rate is often associated with extreme prematurity, low birth weight, and severe complications such as RDS and sepsis. This emphasizes the importance of improving the quality of neonatal care, especially in resource-limited settings, where the availability of advanced medical interventions is limited.

Implications for Future Care

The findings of this study underscore the importance of improving antenatal care to prevent preterm births and early interventions in the management of preterm neonates. Early identification of at-risk pregnancies through regular antenatal visits, timely management of maternal complications, and the provision of specialized neonatal care can improve outcomes for preterm infants. Furthermore, enhancing the capacity of NICUs, particularly in terms of infection control measures, respiratory support, and nutritional management, is essential to reduce the morbidity and mortality associated with preterm birth.

Conclusion

In conclusion, while significant strides have been made in improving the survival of preterm neonates, the associated morbidity remains a challenge. The results of this study reinforce the need for ongoing efforts to reduce preterm birth rates and improve neonatal care to ensure better outcomes for these vulnerable infants. Future studies should focus on long-term follow-up of preterm neonates to assess neurodevelopmental outcomes and identify factors that can further optimize their care.

References:

1. Als H, Butler S, Kosta S, McAnulty G. The Assessment of Preterm Infants' Behavior (APIB): furthering the understanding and measurement of neurodevelopmental competence in preterm and full-term infants. *Ment Retard Dev Disabil Res Rev.* 2005;11(1):94-102

2. Crilly CJ, Haneuse S, Litt JS. Predicting the outcomes of preterm neonates beyond the neonatal intensive care unit: What are we missing? *Pediatr Res.* 2021 Feb;89(3):426-445
3. Zivaljevic, J.; Jovandaric, M.Z.; Babic, S.; Raus, M. Complications of Preterm Birth—The Importance of Care for the Outcome: A Narrative Review. *Medicina* 2024, 60, 1014. <https://doi.org/10.3390/medicina60061014>
4. You, J., Shamsi, B.H., Hao, Mc. *et al.* A study on the neurodevelopment outcomes of late preterm infants. *BMC Neurol* 19, 108 (2019). <https://doi.org/10.1186/s12883-019-1336-0>
5. Anderson PJ, De Luca CR, Hutchinson E, et al. Attention problems in a representative sample of extremely preterm/extremely low birth weight children. *Dev Neuropsychol.* 2011;36:57–73.
6. Tao H, Zhou XY. Clinic problems in late preterm infants. *Chin J Perinat Med.* 2013;16(3):189–91.
7. Nepomnyaschy L, Hegyi T, Ostfeld BM, et al. Developmental outcomes of late-preterm infants at 2 and 4 years. *Matern Child Health.* 2012;16:1612–24.
8. Lechner, B.E.; Vohr, B.R. Neurodevelopmental Outcomes of Preterm Infants Fed Human Milk: A Systematic Review. *Clin. Perinatol.* 2017, 44, 69–83
9. Almadhoob, A.; Ohlsson, A. Sound reduction management in the neonatal intensive care unit for preterm or very low birth weight infants. *Cochrane Database Syst. Rev.* 2020, 1, CD010333.
10. Özek, E.; Kersin, S.G. Intraventricular hemorrhage in preterm babies. *Turk. Pediatri. Ars.* 2020, 55, 215–221