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EXPLORING PERINATAL AND NEONATAL RISK FACTORS LINKED TO NICU ADMISSION: A CROSS-SECTIONAL ANALYSIS

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ABSTRACT

Background: *The admission of infants to the Neonatal Intensive Care Unit (NICU) is often necessitated by various perinatal and neonatal risk factors that can impact the health and well-being of newborns. In this context, a comprehensive understanding of perinatal and neonatal risk factors for NICU admission is essential for healthcare providers to identify at-risk infants, implement appropriate interventions, and collaborate effectively with multidisciplinary teams to deliver individualized care.*

Aim and objective: *The aim of this study was to comprehensively identify and analyze perinatal and neonatal risk factors contributing to the admission of newborns to the Neonatal Intensive Care Unit (NICU).*

Methodology: *Information of NICU admitted infants was gathered from multiple paediatric hospitals located in different Surat zones, especially those that had Neonatal Intensive Care Units (NICUs). After selection, the Perinatal and Neonatal risk factors were evaluated for the infants in accordance with the evaluation form*

Result: *Descriptive analysis of the current study identified Perinatal risk factors ratio includes Caesarean section (69.36%),Vacuum delivery (2.11%), Infants with LBW(37%) VLBW(20.1%), twins (18.3%), cord around the neck (2.8%),Premature birth <37 weeks 34.2%) delay birth cry (23.2%)Birth Asphyxia(20.1%),Meconium aspiration(4.6%)Fetoplacental Infection(0.7%)small for gestational age (5.6%)*

NeonatalRiskFactors:Hyperbillirubinemia(19.7%),Neonatal seizure(10.6%),Low apgar score(2.5%)Neonatal hypoglycemia(2.1%),Periventricular leukomalacia(0.4%) Respiratory Distress Syndrome(18.7%), Neonatal sepsis(1.1%)

Conclusion: *This study provides a foundation for evidence-based decision-making in Perinatal and Neonatal healthcare. By understanding the multifaceted determinants of NICU admissions, we can work towards developing holistic strategies that enhance the overall health outcomes for the newborns.*

KEY WORDS: *Perinatal and Neonatal risk factors, NICU admission*

INTRODUCTION

The admission of infants to the Neonatal Intensive Care Unit (NICU) is often necessitated by various perinatal and neonatal risk factors that can impact the health and well-being of newborns. Perinatal refers to the period around the time of birth, encompassing the late stages of pregnancy and the immediate postnatal period. Neonatal pertains to the first 28 days of life, a critical phase during which infants are particularly vulnerable to various health challenges.

The neonatal phase, which is the first 28 days of an infant's life, is a vulnerable period due to many reversible severe illnesses. Low infant birth weight and premature babies are at a higher risk and are universally acknowledged as the ranking causes of morbidity and neonatal deaths.[1]

Perinatal risk factors for NICU admission may include maternal health conditions, pregnancy complications, fetal distress during labor, and obstetric interventions, among others. These factors can influence the intrauterine environment and fetal development, potentially leading to preterm birth, low birth weight, birth trauma, or perinatal asphyxia, necessitating intensive medical care upon delivery.

Neonatal risk factors encompass a broad spectrum of conditions such as prematurity, respiratory distress syndrome, congenital anomalies, sepsis, hypoglycemia, and neurological abnormalities. These factors often manifest shortly after birth and may require immediate attention and specialized management to optimize the newborn's chances of survival and long-term health outcomes.

In this context, a comprehensive understanding of perinatal and neonatal risk factors for NICU admission is essential for healthcare providers to identify at-risk infants, implement appropriate interventions, and collaborate effectively with multidisciplinary teams to deliver individualized care. This paper explores the diverse array of perinatal and neonatal risk factors contributing to NICU admissions, highlighting their clinical significance, management implications, and potential impact on infant health and development. By elucidating these factors, healthcare professionals can enhance their ability to recognize high-risk newborns, optimize clinical outcomes, and support families through the challenging NICU experience.

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There are various indications and risk factors for NICU admission. Premature neonates have a great risk for NICU admission and may need mechanical ventilation and thermoregulation.[2]

Admitting a baby to a neonatal intensive care unit (NICU) comes with hazards for the infant and stress for the family, not to mention a hefty price for the healthcare system. Preterm newborns have been the primary focus of most research that have assessed admission and risk factors for NICU utilization.

The NICU must have highly sophisticated facilities and equipment to address critical cases, facilitate adjustment of the newborn to the extrauterine life, and establish and maintain normal respiration of a high-risk newborn. Although NICU helps to reduce mortality, it is scarce and is a financial burden on the healthcare system in developing countries.[3]

we aim to enhance our understanding of the key determinants that predispose newborns to NICU admission, ultimately contributing to the development of targeted interventions and improved Perinatal and neonatal healthcare practices.

This research aims to contribute valuable insights that can inform clinical practices, guide policy decisions, and ultimately improve the overall well-being of newborns by minimizing the occurrence and impact of NICU admissions.

AIM AND OBJECTIVE

The aim of this study was to comprehensively identify and analyze perinatal and neonatal risk factors contributing to the admission of newborns to the Neonatal Intensive Care Unit (NICU).

METHODOLOGY

In order to analyse the Perinatal and neonatal risk factors for NICU admission, A retrospective cross-sectional study was conducted among all admitted neonates in the NICU from various paediatric hospitals situated across different zones in Surat, with Neonatal Intensive Care Units (NICUs) set up. This investigation was a component of a broader newborn cohort research that included infants born in Surat, Gujarat.

Study Design: cross sectional study
Study Population: Male and Female high risk NICU Infant, from different hospital of different zones of Surat
Sampling: Purposive
Sample size: 284

Source of data: Different Paediatric hospitals with NICU centres from different zones of Surat, visited frequently, from different zones of Surat, India

Inclusion Criteria

1. Infants who admitted In NICU within one month after birth,
2. Both Male and Female NICU Infants

Exclusion Criteria

1. Infant who had a major congenital abnormality such as eg, Hydrocephalus, Spinabifida, Arnold Chiari malformation etc.

Procedure

After obtaining ethical approval from the institutional review board, a comprehensive literature review was undertaken to identify perinatal and neonatal risk factors. Subsequently, during the data collection phase, information was sourced from various paediatric hospitals situated across different zones in Surat, with a particular focus on those equipped with Neonatal Intensive Care Units (NICUs). Parents were contacted and personally met, wherein they were briefed on the study's objectives and requested to provide written, informed consent. Following the selection process, the infants' perinatal and neonatal risk factors were assessed using an evaluation form. This form also included detailed patient demographic information and Perinatal and neonatal risk factors.

Demographic data includes Name, gender, Date of Birth, Mothers age, fathers age, mother education and occupation, father education and occupation

Perinatal Risk Factors: Place of delivery: home or Hospital, Normal Vaginal, Instrumental, Planned LSCS: Emergency, If instrumental(forceps) or vacuum delivery, Breech Presentation, Low Birth weight, single or twins' baby, if history of cord around the neck, history of premature rupture of membrane, history of premature birth < 37 weeks, History of delay birth cry, Birth Asphyxia, history of meconium aspiration, foeto placental infection, small for gestational age

Neonatal Factors: Lack of Breast feeding, hyperbilirubinemia, Neonatal seizure, any dysmorphic feature, Periventricular leukomalacia, Respiratory distress syndrome, Neonatal sepsis

DATA ANALYSIS

The subsequent step involved performing descriptive analysis of 284 infants' data, by using SPSS 20.0

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Table: 1 Perinatal Risk Factors

Variable	Frequency	Percentage
Place of delivery: home	2	0.7
Hospital	282	99.29
Normal Vaginal	78	27.46
Instrumental	9	3.16
LSCS (Total)	197	69.36
Planned LSCS	85	29.92
Emergency LSCS	112	39.43
If instrumental(forceps)	3	1.05
Vaccum delivery	6	2.11
Breech	7	2.46
Birth weight 2.5 to 4	122	42.95
1.5 to 2.5kg	105	37.0
<1.5 kg	57	20.1
Single	232	81.69
Twins	52	18.3
Cord around the neck	8	2.8
Premature rupture of membrane	27	9.5
Premature birth <37 weeks	97	34.2
Delay Birth cry	66	23.2
Birth asphyxia	57	20.1
Meconium aspiration	13	4.6
Foeto placental infection	2	0.7
SGA	16	5.6

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Graph : 1 Perinatal Risk Factors

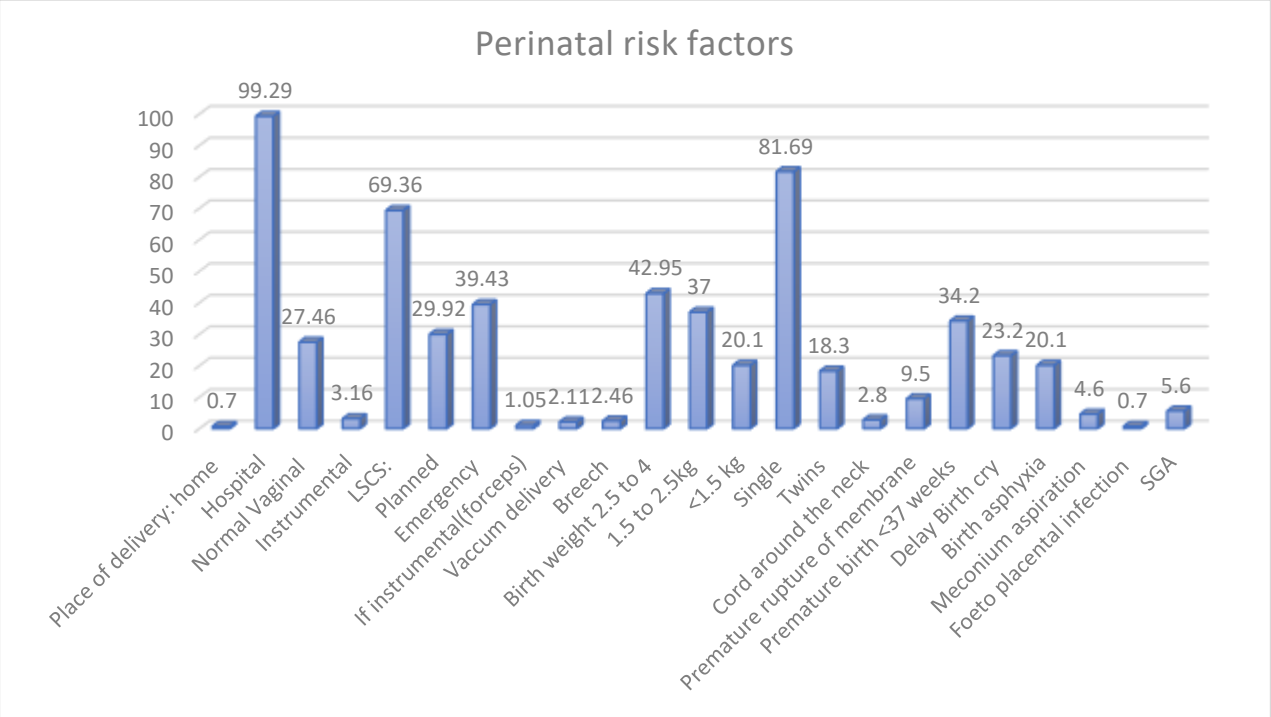


Table: 1 and graph: 1 shows – Perinatal risk factors ratio includes Hospital delivery is (99.29%) while home delivery (0.7%), Normal vaginal (27.46%), Caesarian section (69.36%) Planned LSCS (29.92%), emergency LSCS (39.43%), Instrumental forcep delivery delivery (1.05%) vaccum delivery (2.11%),Breech Presentation(2.46%),Infants with Birth weight 2.5 to 4 kg (42.95%),1.5 to 2.5 kg (37%)<1.5kg(20.1%),single child (81.69%)twins (18.3%)cord around the neck (2.8%)Premature rupture of membrane (9.5%),Premature birth <37 weeks 34.2%)h/o delay birth cry (23.2%)Birth Asphyxia(20.1%),H/O Meconium aspiration(4.6%)Foetoplacental Infection(0.7%)small for gestational age (5.6%)

Table: 2 Neonatal Risk Factors

Variable	Frequency	Percentage
NICU stay duration 1-7 days	172	60.56
8-15 days	45	15.84
15-30	67	23.59
Lack Of Breast Feeding	25	8.8
Hyper Billirubinemia	56	19.7
Neonatal Seizure	30	10.6
Low Apgar Score	7	2.5
Neonatal Hypoglycemia	6	2.1
Any Dysmorphic Feature	2	0.7
Peri Ventricular Leukomalacia	1	0.4
Respiratory Distress Syndrome	53	18.7
Neonatal Sepsis	3	1.1

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Graph: 2 Neonatal Risk Factors

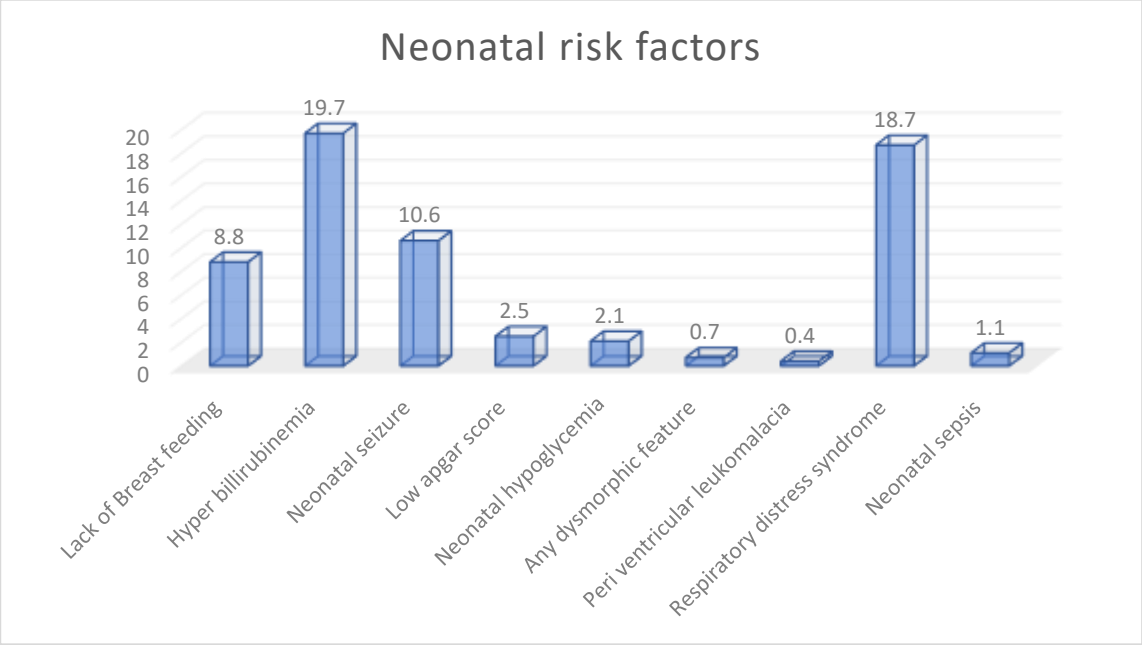


Table 2 and graph 2 shows Neonatal risk factors includes – Lack of Breast feeding (8.8%),Hyperbillirubinemia(19.7%),Neonatal seizure(10.6%),Low apgar score(2.5%)Neonatal hypoglycemia(2.1%),Any dysmorphic features(0.7%)Periventricular leukomalacia(0.4%)Respiratory Distress Syndrome(18.7%),Neonatal sepsis(1.1%)

DISCUSSION

In this study, we conducted a comprehensive cross-sectional analysis to explore the trends and determinants associated with Neonatal Intensive Care Unit (NICU) admissions. The investigation focused on perinatal and neonatal risk factors to provide a nuanced understanding of the complex interplay influencing newborns' vulnerability to NICU admission.

Caesarean section has been suggested as a risk factor for respiratory morbidity and thus a cause of admission to the NICU in term neonates.[4,5] However, our results showed that emergent caesarean delivery was more common in the NICU-admitted group that is 69.36% is more than a study in the United States that found a 50% caesarean section rate in their NICU cohort.[6]

Similarly, in a study conducted in Iran by Fallahi et al.,7 caesarean section deliveries accounted for 58.6% of the admitted neonates. A study has revealed the advantages associated with caesarean section, including higher 1-minute score, less intraventricular haemorrhage, and lower mortality rate;7However, recently, the prevalence of caesarean-section has increased 8 Preterm birth is often regarded as the leading risk factor for perinatal morbidity and death, as 15 million newborns are prematurely born every year.[9]

The risk of early newborn death is very high across several regions with negative particularities, according to data collected from 186 countries.[10] Roughly half of all newborn deaths happened within 24 h of birth, and about a third occurred within the first 6 h.[11] In our study 34.2 %Premature birth were there.

Previous studies in Ethiopia[12], Benin[13], and Eretria[14] also found breech and vacuum deliveries to be significant risk factors for neonatal mortality in neonates referred to NICUs. In our study ratio of Instrumental delivery was (1.05%) forcep delivery and (2.11%) vaccum delivery

Some studies have reported that 1-minute Apgar score and low birth weight are the major risk factor for prolonged hospitalization, while fetal infections are significantly involved in both prolonged hospitalization and mortality.[15-18] while in our study Low apgar score is (2.5%) amnd Foetoplacental Infection(0.7%)only

According to the report of the World Health Organization in 2006, the rate of VLBW infants in Iran has been 7%. Moreover, 31% of neonatal mortalities have been due to premature birth.[19] Therefore, it seems that prematurity problems and VLBW infants need to be dealt with and eliminated through required measures. In addition, the rates of nosocomial infections[20] In our study Low Birth Weight was 37% and Very Low Birth weight was 20.1%
In two of the studies, it shown Due to prolonged labor led to fetal acidemia and respiratory distress syndrome, thus requiring further evaluation and treatment.[21,22] Unlike the results of other studies, In our study ratio of Respiratory distress syndrome is 18.7% On the other hand, timely management of labor and neonates, preventing premature birth and low birth weight, prenatal diagnosis and early management of congenital anomalies and

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timely and effective treatment of pregnancy diseases as well as perinatal and nosocomial infections are had also affected the decline in perinatal mortality. Advanced neonatal intensive care is of high importance and requires trained staff, advance devices and high costs of neonatal intensive care unit (NICU) stay.[23]

In one study they found the most common causes of admission to the NICU were neonatal sepsis (27.3%), and asphyxia (13.1%). This finding is more or less the same as it was observed in the study conducted by Kanodia et al.15 and in our study Neonatal sepsis (1.1%) and Birth Asphyxia(20.1%).[24]

In one study it is found that primary diagnosis of hypoglycaemia, jaundice, sepsis, and respiratory distress syndrome were associated with 65%, 59%, 51%, and 25% decrease in neonatal morality, respectively. While in our study Hyperbilirubinemia(19.7%),Neonatal seizure(10.6%) and Neonatal hypoglycaemia(2.1%) respectively[25]

The order of these diseases as the common causes of admission varies from one study to another depending on the risk factors and the criteria used to diagnosis of the diseases.[26]This could be explained by the fact that prematurity increases the likelihood of underweight, and increases the risk complications such as sepsis, other infections, and birth asphyxia.[27]

CONCLUSION

In conclusion, this study provides a foundation for evidence-based decision-making in Perinatal and neonatal healthcare. By understanding the multifaceted determinants of NICU admissions, we can work towards developing holistic strategies that enhance the overall health outcomes for the newborns.

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