Study of Evaluation of Factors Affecting Admission of Term Neonates Into NICU

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Abstract: *Introduction: This study aims to identify and quantify the risk factors leading to NICU admission of term neonates, contributing to the development of a predictive model for high risk births. Materials and Methods: Present study is a retrospective study conducted from January 2024 to June 2024. All term neonates admitted in NICU directly after birth in MGM NICU and within the duration of mother's hospital stay were enrolled. After identifying the data, detailed information regarding the factors affecting admission of term neonates are noted. Data entered in Microsoft Excel and analyzed using SPAA version 24.0th. Mean and SD calculated from quantitative variables and proportions calculated for categorical variables. Data presented in the form of visual impressions like bar diagrams, etc. Incidence and relative risk calculated. P value of <0.05 was considered as statistically significant. Inclusion Criteria: All term neonates admitted in MGM NICU directly after birth and later within the duration of mother's hospital stay. Exclusion Criteria: 1) Term neonates admitted in outside NICU. 2) Term neonates referred to MGM NICU from outside. Results: RDS and hyperbilirubinemia were the most frequent causes of NICU admission. Understanding these factors will help improve training for medical and paramedical staff, aiming to reduce NICU admissions, especially for term neonates.*

Keywords: NICU admission, term neonates, Hyperbilirubinemia, respiratory distress, MSL

1. Introduction

- Neonatal intensive care units (NICUs) are essential for providing critical care to newborns who need extra support. However, admitting a neonate to the NICU can be challenging for both the infant and their family, often involving high costs and the disruption of key bonding moments, such as breastfeeding and time spent with the mother.
- The neonatal period is a crucial time for infants, marked by rapid physiological changes that can impact their health.
- Most research so far has focused on the risks leading to NICU admissions for preterm infants. However, the increasing number of full-term babies being admitted to NICUs calls for a closer look at the factors behind these admissions.
- This study aims to identify and measure the risk factors and causes that contribute to NICU admissions for full-term neonates. By doing so, it could help create a model to predict high-risk pregnancies before delivery. Recognizing factors that can be changed may lead to fewer health complications for babies and help reduce the rates of illness and death in newborns.

Aim:
- To study the factors affecting admission of term neonates into NICU

Objectives:
- To identify and analyse the maternal and foetal factors, demographic factors that contribute to NICU admission of term neonate.
- To provide data that can inform healthcare policies and initiatives aimed at improving maternal and neonatal health

2. Material and Methods

- Study Area: Department of Obstetrics and Gynecology, MGM Medical College and Hospital, Chh. Sambhajinagar.
- Study population: All term neonates admitted in MGM NICU immediately after birth and later within the duration of the mother's hospital stay
- Study design: A retrospective study
- Study period: After approval of Ethics committee: January 2024 to June 2024
- Sample size: 179

3. Procedure

After approval from Ethical committee, data was obtained from Department of Obstetrics and Gynecology.

All term neonates who were admitted in MGM NICU directly after birth and later within the duration of mother's hospital stay from January 2024 to June 2024 were studied from the official data registers of the hospital and from patients' hospital records.

After identifying the data, detailed information regarding the factors affecting admission of term neonates were noted.

Data was entered in Microsoft Excel and analyzed using SPAA version24.0th. Mean and SD will be calculated from quantitative variables and proportions will be calculated for categorical variables. Data was presented in the form of visual impressions like bar diagrams, etc. Incidence and relative risk will be calculated. P value of <0.05 was considered statistically significant.

4. Tables and Results

Table 1: Maternal demographics

Sr No	Parameter	Number of cases, N= 179	Percentage 100%
1	Geographical area		
	a. Urban	23	40%
	b. Rural	89	60%
2	Booking Status		
	a. Regularly Booked	109	61%
	b. Irregularly Booked	69	38%
	c. Unbooked	1	1%
3	Parity		
	a. Primipara	67	37%
	b. Multipara	106	60%
	c. Grand Multipara	6	3%

- The percentage of neonates going to NICU is practically same in rural and urban settings.
- In spite of being regularly booked, 61% of neonates were shifted to NICU. (Early detection of risk factors and early diagnosis can explain this)
- Multiparity also plays important role in admission of term neonates in NICU.

Table 2: Antenatal history

Sr No	Parameter	Number of cases	Percentage 100%
1	Inter-pregnancy interval (Years)	N= 112	
	a. ≤ 1.5	23	21
	b. > 1.5	89	79
2	Gestational age at birth (weeks)	N= 179	23
	a. 37 to 37.6	42	29
	b. 38 to 38.6	52	34
	c. 39 to 39.6	61	13
	d. >40	24	

- In 21% of cases where interpregnancy interval was < 1.5 % NICU admission were noted.
- In my study mean gestational age was 39 weeks.

Table 3: Risk factors

Sr No	Risk Factor	No of Cases (N=145)	Percentage (%)
1	**Maternal Diseases**	97	73%
	1. Hypothyroidism	22	17%
	2. PROM	19	14%
	3. GDM	12	9%
	4. Preeclampsia	11	8%
	5. Rh-negative pregnancy	11	8%
	6. Anaemia	8	6%
	7. Obesity	6	5%
	8. Gestational thrombocytopenia	4	3%
	9. Heart disease	3	2%
	10. Seizure disorder	1	1%
2	OLIGOHYDRAMNIOS	25	14%
3	FGR	23	13%

- Maternal antenatal risk factors were the most common cause of admission of term neonates in NICU
- Among the maternal risk factors, hypothyroidism being the most common followed by PROM, GDM, preeclampsia and Rh-negative pregnancy.
- Oligohydramnios and FGR were also one of the important causes.
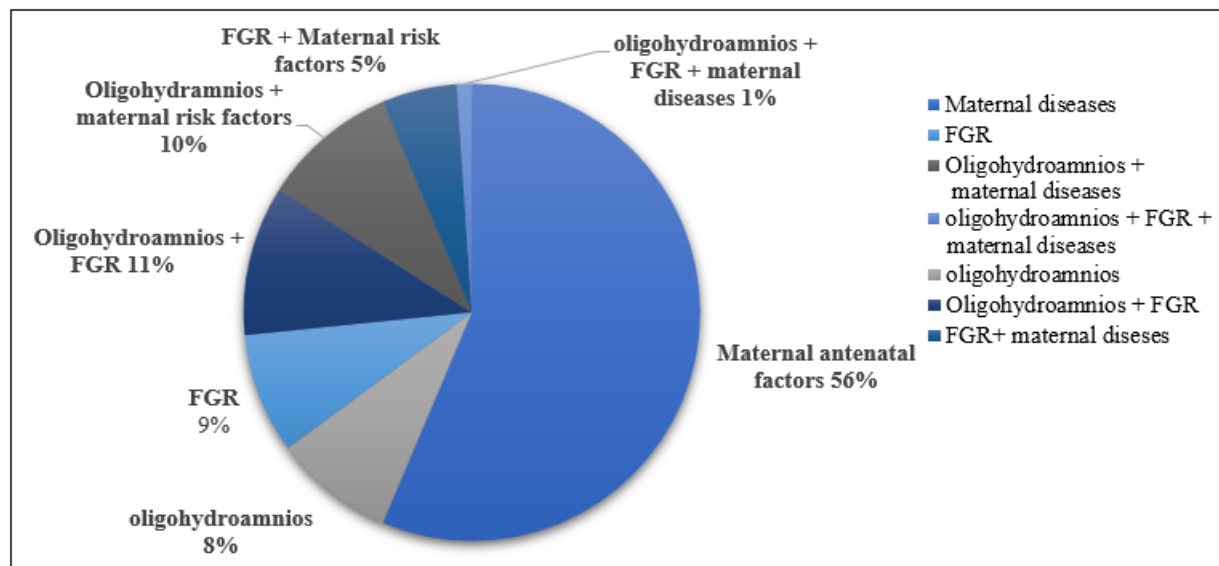
Maternal antenatal risk factors, FGR and oligohydramnios are the important factors for admission of term neonates into NICU not only individually but also shows overlapping nature.

Table 4: Mode of delivery
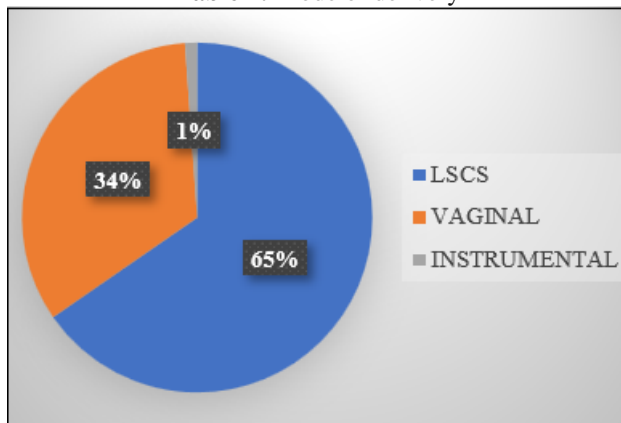
- 65% of cases underwent LSCS
- Among the vaginal deliveries (34%), 65% were spontaneously delivered and 32% underwent induction of labor.

Table 5: Intrapartum/Intraoperative finding of Meconium-stained liquor

S. No	Intrapartum/ Intraoperative Findings of MSL	N=179	Percentage
1	Yes	38	21
2	No	141	79

21% of neonates had meconium-stained liquor.

Table 6: APGAR Score at 1 min
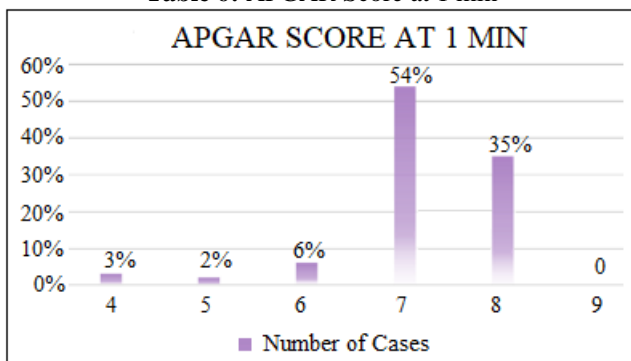
54% of the neonates had APGAR score of 7 at 1 minute

Table 7: Baby weight at birth

S. No	Baby Weight at Birth	N=179	Percentage
1	LBW (1.6 to 2.5)	38	21
2	2.6 to 4 KG	139	78
3	> 4 KG	2	1

78% of neonates had weight of 2.6 to 4 kg at birth.

Table 8: Cause of NICU admission in babies shifted immediately after birth

S. No	Causes	N=89	Percentage
1	Respiratory distress syndrome	76	85
2	Meconium aspiration syndrome	5	6
3	Congenital anomaly	2	3
4	LBW	1	1
5	Birth asphyxia	3	4
6	Hypoglycemia	1	1

Respiratory distress syndrome was the most common cause of admission as 85% of cases were noted with respiratory distress syndrome.

Table 9: Cause of NICU admission in babies shifted later during maternal stay

S. No	Causes	N=90	Percentage
1	Hyperbilirubinemia	55	61
2	Weight loss	14	16
3	Respiratory distress syndrome	10	11
4	sepsis	9	10
5	hypoglycemia	1	1
6	convulsions	1	1

Hyperbilirubinemia is the most common cause of admission of term neonate into NICU (61%)

5. Discussion

The neonatal period is the most critical phase affecting a child's survival and well-being, marked by major physiological adaptations. Factors increasing NICU admissions among term infants include birth method, maternal health issues (like diabetes, hypertension), ethnicity, age, and socioeconomic status. Early identification and interventions may reduce NICU admissions. While most studies focus on preterm infants, the present study enrolled term neonates admitted directly after birth at MGM NICU during maternal hospitalization. Among 179 cases, 60% were rural, and 61% had regular antenatal bookings. Multiparas comprised 60%, and primiparas 37%. Inter-pregnancy intervals were >1.5 years in 50% of cases. Gestational age was 39–39.6 weeks in 34% and 38–38.6 weeks in 29%. Major risk factors were hypothyroidism (12%), PROM (11%), GDM (7%), and Rh negativity (6%). 90% of NSTs were reactive. LSCS was the mode of delivery in 65% of cases, and 35% delivered vaginally, of which 65% were spontaneous. Meconium-stained liquor was seen in 21%. APGAR scores were mostly 7 (54%) or 8 (35%). Baby weights ranged between 2.6–4 kg in 78% of cases. Immediate NICU admission occurred in 50% of cases, primarily due to respiratory distress syndrome (42%) and hyperbilirubinemia (31%). Breech presentation was seen in only 6%. Similar studies identified respiratory distress, structural malformations, and hypoglycemia as major causes of NICU admissions. Unexpected NICU admissions among term newborns are increasing, largely influenced by surgical deliveries, maternal infections, and chronic conditions. Better prenatal care, timely referrals, and safe delivery practices can minimize unnecessary NICU admissions, enhancing maternal and neonatal outcomes.

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Comparative Data from Different Studies

Study	Key Findings
Talisman S et al (2022)	Mean maternal age: 29.3 ± 6.2 years, Mean parity: 3.3 ± 2.6; 59.4% primiparous. Mean gestational age lower in NICU admissions. NICU causes: respiratory disorders (47.1%), congenital malformations (44.7%), jaundice (11%).
Dr. Shruti KK et al (2023)	Mean gestational age: 39 weeks; mean birth weight: 3.3kg. 7.9% mothers were Rh-negative. Delivery: 43.6% spontaneous, 20.8% induced, 29.7% caesarean.
Rashid R et al (2022)	Vaginal deliveries: 57.1%, LSCS: 42.9%.
Aagaard H et al (2015)	Main NICU diagnoses: hypoglycemia, respiratory distress, cardiovascular instability, hyperbilirubinemia.
Shahar Talisman et al (2023)	Main NICU cause: hyperbilirubinemia/jaundice (80.2%).

6. Conclusion

- In this study, respiratory distress syndrome was the most common cause of NICU admission immediately after birth.
- Hyperbilirubinemia was the most common cause of NICU admission later during maternal stay. This emphasizes the importance of exclusive breastfeeding
- NICU admissions are often due to combination of multiple complex factors.
- Status of early neonatal period is the major contributor to neonatal morbidity as assessed well by birth weight and APGAR score.
- Meconium-stained liquor is a common clinical findings in labor that can significantly influence the need of NICU admission.

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