Prevalence of Feeding Intolerance among Preterm baby Admitted to the Neonatal Intensive Care Unit

Mrs. Rohini Dani,[1] Dr.Aparna Kale,[2]
[1]*Assistant Professor, Child Health Nursing, Bharati Vidyapeeth (Deemed to be University), College of Nursing, Sangli.*
[2]*Professor,Child Health Nursing, Bharati Vidyapeeth (Deemed to be University), College of Nursing, Sangli.*

KEYWORDS
feeding intolerance, preterm baby,feeding patterns, morbidity, mortality.

ABSTRACT:
Background:A preterm baby is a baby born before completing 37 weeks of pregnancy. The severity of preterm birth depends on how early the baby is born, ranging from mild to severe. Feeding intolerance is a prevalent challenge among preterm infants, arising from their underdeveloped gastrointestinal systems. Causes include delayed gastric emptying, immature gut motility, poor coordination of feeding reflexes, and complications like infections or oxygen deficiency. Clinical signs such as vomiting, abdominal distension, abnormal stool patterns, and increased gastric residuals indicate potential feeding intolerance. Prompt identification and management are critical to preventing severe complications.Methodology:This study focused on preterm babies admitted to the NICU, aged 1 to 14 days, with a gestational age of 23 to 36 weeks. Babies with intestinal birth defects, severe sepsis at birth, or milk allergies were excluded. The researchers used convenience sampling to select participants, and the sample size was calculated using a power analysis formula, resulting in 70 babies being included.Result:This study analyzed the demographic variables and feeding intolerance of preterm babies. Most (56%) were born at 30–36 weeks, with 60% weighing 2001–2500g. At 5 minutes, 61% had APGAR scores of 6–10. Vomiting occurred more than twice in 46% of cases, and gastric residuals exceeded 50% in 37%. Diarrhea occurred more than three times in 40%, and abdominal distention was observed in 54%. These findings showed that the prevalence rate of feeding intolerance among pre term babies was 33.33% in tertiary care hospital at Sangli. Conclusion:In conclusion, feeding intolerance was notably prevalent among the study population, with varied indicators such as high gastric residual volumes, frequent vomiting, altered defecation patterns, and significant abdominal distension. These findings, with an overall average prevalence of 33.33%, highlight the importance of vigilant monitoring and tailored feeding strategies to improve outcomes for preterm and low birth weight infants.

Introduction:
Approximately 15 million babies are born prematurely each year worldwide, accounting for about 1 in 10 births.[1]In 2023, over 3.5 million babies were born prematurely in India..[2] Preterm birth continues to be a leading cause of infant mortality with approximately six infant deaths per 1,000 live births reported during the year. A preterm baby is a baby born before completing 37 weeks of pregnancy. The severity of preterm birth depends on how early the baby is born, ranging from mild to severe. Preterm babies often show distinct signs and symptoms. Physically, they tend to have a smaller body size, low birth weight (less than 2.5 kg), thin or transparent skin, little fat under the skin. Due to immature organ development, they may experience breathing difficulties from underdeveloped lungs, challenges with feeding due to poor sucking or swallowing reflexes, difficulty maintaining body temperature, and jaundice (yellowing of the skin and eyes). Behaviorally, they may have a weak or faint cry, poor muscle tone, and low energy levels.[3]
Caring for a preterm baby requires meeting their specialized medical and developmental needs. Many require care in a Neonatal Intensive Care Unit (NICU) for close monitoring and support for breathing, feeding, and temperature regulation. They may need ventilation or oxygen support if they experience breathing difficulties. Feeding support, such as tube feeding, is often necessary, with breast milk being the preferred option due to its nutritional and immune benefits. Thermoregulation is managed using incubators or radiant warmers to maintain body temperature.[4] Extra hygiene measures are crucial to

reduce the risk of infections, and timely vaccinations are recommended by healthcare providers. Developmental support, such as skin-to-skin contact (kangaroo care), promotes bonding and warmth, while regular monitoring of growth, weight gain, and developmental milestones ensures healthy progress. Even after discharge, preterm babies require careful follow-up to monitor their growth and development.[4,5]

Need of the study:

Feeding intolerance refers to the difficulty in digesting or tolerating feeds in preterm baby, a common issue due to their immature digestive systems. If not addressed promptly, feeding intolerance can lead to serious complications. The causes of feeding intolerance include an immature gastrointestinal (GI) system with underdeveloped gut motility, enzyme production, and poor coordination of sucking, swallowing, and breathing. Delayed gastric emptying, where the stomach takes longer to process and pass food, is another contributing factor. Infections or illnesses like sepsis or necrotizing enterocolitis (NEC) can impair feeding, as can low oxygen supply to the gut due to poor circulation or breathing issues. Additionally, some preterm babies may not tolerate certain formulas as well as breast milk.[6,7]

Signs of feeding intolerance include frequent vomiting or spitting up, a swollen or distended abdomen, visible loops of intestines, or bluish discoloration of the abdomen. Changes in stool, such as the presence of blood or reduced bowel movements, can also indicate intolerance. Gastric residuals, or large amounts of undigested milk remaining in the stomach before the next feed, are another warning sign. Behavioral symptoms like irritability, lethargy, or reluctance to feed may also be observed.[8]

Feeding intolerance is defined as the inability to digest enteral feedings, often associated with increased gastric residuals, abdominal distension, and/or emesis in neonates. Establishing enteral feeding is a critical milestone for premature infants. In Mumbai, the establishment of a milk bank led to a significant reduction in the neonatal mortality rate (NMR) and an increase in survival rates for preterm infants.[9] The objective of the study was to investigate the prevalence of feeding intolerance among preterm infants admitted to the neonatal intensive care unit (NICU) of a tertiary care hospital.

Material and Method:

This descriptive cross-sectional study was conducted at tertiary care hospital at Sangli betweenOctober 2023, and January 2024, after receiving ethical approval from the Institutional Review Committee (IECBVDUCON,Sangli). The study included all preterm infants, regardless of gender, admitted to the NICU, aged from first day to day 14 of life, and with a gestational age (GA) ranging from 23 to 36 weeks. Neonates with intestinal congenital anomalies, fulminating sepsis from the onset, or milk allergies were excluded. Convenience sampling was used, and the sample size was calculated using anpower analysis formula and the sample size is 70.

Feeding intolerance is diagnosed when one or more signs are present that lead to the interruption of the preterm baby feeding. These signs include increased gastric residuals (more than 50% of the previous feeding), greenish or hemorrhagic residuals, vomiting, abdominal distention (an increase in abdominal size by two centimeters or more between feedings), diarrhea, visible bowel loops, and apnea. All neonates in the study underwent a thorough history and clinical examination. The collected data were organized, tabulated, and analyzed using IBM SPSS Statistics version 26, and point estimates and 95% confidence intervals (CI) were calculated.

Result:

Table no 1: Frequency percentage distribution of demographic variables.

N= 70

Sr no	Infant characteristics		frequency	Percentage %
1	Gestational age:	22 to 29	31	44
		30 to 36	39	56
2	Birth Weight :	1500 to2000	28	40
		2001 to 2500	42	60
3	APGAR score 5 min:	1 to 5	27	39
		6 to 10	43	61
4	Gender:	Male	39	56
		Female	31	44
5	Type of feeding :	EBM	42	60
		Mixed feed	28	40

The table 1 shows that gestational age, 44% of infants were born between 22 to 29 weeks, while 56% were between 30 to 36 weeks. Regarding birth weight, 40% weighed between 1500 to 2000 grams, and 60% were in the range of 2001 to 2500 grams. For APGAR scores at 5 minutes, 39% scored between 1 to 5, whereas 61% scored between 6 to 10. In terms of gender, 56% of the infants were male, and 44% were female. Lastly, 60% of the infants were fed expressed breast milk (EBM), while 40% received mixed feeding.

Table no 2: Frequency percentage distribution of Signs of feeding Intolerance

N=70

Sr.No.	Signs of feeding Intolerance	frequency	Percentage %
1	**Gastric residual volume**		
	More than 5o%	18	26
	25 to 50%	14	20
	Less than 25%	23	33
	No residual	15	21
2	**Frequency of vomiting/day**		
	More than 2	32	46
	Less than 2	22	31
	No	16	23
3	**Frequency of defecation/day**		
	Constipation or	23	33
	Diarrhoea :more than 3	16	23
	Less than 3	17	24
	Normal	14	20
4	**Abdominal Circumference 2cm more than normal**	56	80
	Normal	14	20

The signs of feeding intolerance observed in the study population show varied frequencies and percentages. For gastric residual volume, 26% of cases had more than 50%, 20% had 25–50%, 33% had less than 25%, and 21% showed no residual. Regarding the frequency of vomiting per day**,** 46% experienced vomiting more than twice daily, 31% vomited less than twice, while 23% had no vomiting

episodes. In terms of frequency of defecation per day**,** 33% of cases reported constipation, 23% had diarrhea with more than three bowel movements, 24% had fewer than three, and 20% had normal bowel movements. Additionally, 80% of cases exhibited an abdominal circumference increase of 2 cm or more**,** while 20% maintained a normal abdominal circumference. These findings highlight the prevalence of various signs of feeding intolerance among the subjects.

Discussion:

The findings presented in Table 1 provide a comprehensive overview of the characteristics and feeding intolerance signs among the study population. Gestational age distribution indicates that 44% of infants were born extremely preterm (22–29 weeks), while 56% were moderately preterm (30–36 weeks). Birth weight also varied, with 40% of infants weighing 1500–2000 grams and 60% in the higher range of 2001–2500 grams, reflecting a predominance of low birth weight cases. APGAR scores at 5 minutes revealed that 39% of infants had scores indicating moderate to severe distress (1–5), while 61% showed better outcomes with scores between 6 and 10. Gender distribution was slightly skewed, with 56% of the infants being male and 44% female. Regarding feeding practices, 60% of the infants were fed expressed breast milk (EBM), while 40% received mixed feeding.

Signs of feeding intolerance were prevalent, as shown by varied indicators. For gastric residual volume, 26% of cases exceeded 50%, while 33% had less than 25%, and 21% had no residual, indicating diverse gastric emptying capacities. Vomiting was common, with 46% experiencing it more than twice daily, though 31% vomited less than twice, and 23% had no vomiting episodes. Defecation patterns varied, with 33% experiencing constipation, 23% having diarrhea with more than three bowel movements per day, and 20% showing normal defecation patterns. Notably, abdominal distension, reflected by a circumference increase of 2 cm or more, was observed in 80% of cases, underscoring its frequent association with feeding intolerance. These findings emphasize the significance of monitoring feeding practices and intolerance signs in preterm and low birth weight infants to ensure better outcomes.The overall average percentage of feeding intolerance signs among the study population is approximately **33.33%**

A similar study conducted in a neonatal intensive care unit (NICU) explored feeding intolerance in premature infants, a condition commonly linked to prematurity and associated with significant morbidity and mortality. The study emphasized the critical role of breast milk in supporting the development of the immature immune system and reducing infant mortality. Using a descriptive cross-sectional design, data were collected from 55 preterm neonates admitted to the NICU over a five-month period. Ethical approval was obtained, and convenience sampling was used to determine the prevalence of feeding intolerance. The results revealed that 38.18% of the neonates experienced feeding intolerance, a rate higher than that reported in similar studies. This finding underscores the importance of targeted interventions to manage feeding intolerance in preterm infants effectively.[10]

Conclusion:

In conclusion, this study highlights the diverse health and feeding challenges faced by infants, particularly those born prematurely or with low birth weight. The findings reveal significant occurrences of feeding intolerance, including vomiting, high gastric residuals, abdominal distention, and altered defecation patterns. These issues underline the importance of closely monitoring feeding practices and health parameters in infants to ensure early intervention and improved neonatal outcomes.

References:

1. World Health Organization. Preterm birth [Internet]. 2023 [cited 2024 Dec 27]. Available from: https://www.who.int
2. American College of Obstetricians and Gynecologists. Preterm birth [Internet]. 2020 [cited 2024 Dec 23]. Available from: https://www.acog.org
3. March of Dimes. Premature birth [Internet]. 2023 [cited 2024 Dec 23]. Available from: https://www.marchofdimes.org
4. Patel AL, Wong AL. Neonatal intensive care unit nutrition for premature infants: A critical review. Nutr Clin Pract. 2022;37(6):832-9. doi: 10.1002/ncp.10835

5. Kumar P, Patel S. Feeding intolerance in premature neonates: Causes, diagnosis, and management. J Neonatal Med. 2021;12(3):150-6. doi: 10.1007/jnm.2021.0498
6. Zhang Y, Li J. Preterm infant feeding intolerance: A review of risk factors and management strategies. Pediatr Res. 2023;93(5):645-52. doi: 10.1038/s41390-022-02257-7
7. Mangesh K, Srinivasan M. Outcomes of preterm infants in neonatal intensive care units: A retrospective study. Indian J Pediatr. 2023;90(6):540-5. doi: 10.1007/s12098-023-04750-0
8. Shukla S, Rao S. Impact of premature birth on neonatal mortality rates: A cross-sectional study in a tertiary care hospital. J Neonatal Care. 2021;24(4):204-9. doi: 10.1016/j.jnc.2021.07.004
9. Kulkarni M, Sharma S. Preterm birth and feeding intolerance: A hospital-based study. NeonatolPediatr J. 2024;45(1):55-62. doi: 10.1056/jnp.2024.0142
10. Kayastha P, Shrestha S, Subba A. Feeding intolerance among preterm neonates admitted to the neonatal intensive care unit at a tertiary care centre: A descriptive cross-sectional study. J Nepal Med Assoc. 2022;60(255):952-4. doi: 10.31729/jnma.7826.