BJHS
Birat Journal of Health Sciences

ISSN:
2542-2758 (Print) 2542-2804 (Online)

ARTICLE INFO:
Received Date: 2024-04-15
Acceptance Date: 2024-12-19
Published Date: 2025-01-01

KEYWORDS:
Feeding intolerance, Necrotizing enterocolitis, Respiratory distress syndrome, Very low birth weight babies

CORRESPONDING AUTHOR:
Ranjana Bista
Department of Pediatrics, UCMS Bhairawaha, Lumbini Pradesh, Nepal.
Email:ranjana.bista4@gmail.com

Access the article online

DOI: https://doi.org/10.62065/bjhs520

CITATION:
Bista R, Gupta BK. Incidence of Feeding Intolerance Among Very Low Birth Weight Babies Admitted in Tertiary Care Hospital: a Prospective Observational Study. Birat J. Health Sci. 2024;9(2):26-30.

Incidence of Feeding Intolerance Among Very Low Birth Weight Babies Admitted in Tertiary Care Hospital: a Prospective Observational Study

Ranjana Bista, Binod kumar Gupta

Department of Pediatrics, UCMS Bhairawaha, Lumbini Pradesh, Nepal.

ABSTRACT

Introduction: Feeding intolerance is common among the preterm neonates. Feeding intolerance is defined as difficulty in ingestion or digestion of the milk that causes a disruption in the enteral feeding. Very Low birth weight (VLBW) infant are defined as baby whose birth weight is less than 1500 gm.

Objectives: Feeding intolerance is high among very low birth weight babies. The study was designed to know the feeding intolerance and its clinical signs and symptoms among very low birth weight babies.

Methodology: This is a part of prospective observational study conducted in in Universal College of Medical Sciences, Bhairahawa, Nepal, for a duration of 12 months among preterm infants aged 28-34 weeks of Gestation. In this study only very, low birth weight babies (VLBW) weighing more than 1000 gm to less than 1500 gm were included

Results: Among the 490 preterm babies (28-34 Weeks), 207(42.2%) were very low birth weight babies. Among very low birth weight babies, feeding intolerance was present in 33 babies (15.9%). There were 69 one or more signs of feed intolerance in the 33 babies of which vomiting was present 31 babies followed by gastric residue, abdominal distension and apnea. The feeding intolerance was more among primiparous mothers, babies fed with formula feed and when feeding was started <24 hours. (P value 0.79, 0.41, 0.35).

Conclusion: Feeding intolerance is common among very low birth weight babies (15.9%). Vomiting along with gastric residue and abdominal distension were common symptoms of feeding intolerance.

INTRODUCTION

Infants that are born after 28 weeks period of gestation and before 37 weeks period of gestation or 259 days from the first day of the last menstrual period are termed preterm by the World Health Organization. The term 'Low birth weight' (LBW) has been defined as first weight recorded within hours of birth of <2500 g. Very low birth weight (VLBW) is accepted as <1500 g and extremely low birth weight (ELBW) is <1000 g.[1]

Preterm birth lead to significant neonatal morbidity compared to term infants like temperature instability, respiratory distress, infections, apnea, hypoglycemia, seizures, jaundice, kernicterus, feeding difficulties, necrotizing enterocolitis, periventricular leukomalacia, and re-hospitalization.[2]

Among different morbidities, feeding intolerance is one of the most common morbidity in preterm infants including VLBW babies. Feeding intolerance is defined as difficulty in ingestion or digestion of the milk that causes a disruption in the enteral feeding plan due to the manifestation of clinical symptoms. Symptoms of feeding intolerance include the presence of gastric residuals, vomiting, abdominal distention, visible bowel loops, diarrhoea, or bloody stool. Apnea, bradycardia and temperature instability are also included as symptoms of feeding intolerance but solely for the purposes of the nursing assessment in order to provide guidance on identification of potential progression to more serious complications such as pneumatosis intestinalis and necrotizing enterocolitis.[3] The incidence of feeding intolerance is about 2-3% in

preterm infants.[4, 5] The provision of adequate enteric nutrition for premature infants is one of the major clinical challenges facing neonatologists throughout the world.

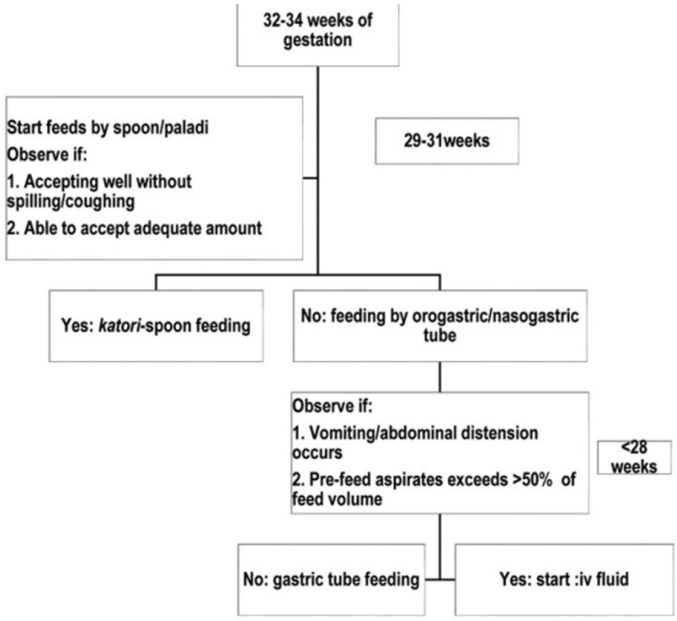
Several feeding regimens have been developed for VLBW infants. Enteral feeding practices significantly influence the incidence of NEC (necrotizing enterocolitis) and the maturation of the GI tract. In a feed-intolerant preterm infant without any other clinical and radiological evidence of NEC, minimal enteral nutrition rather than complete suspension of enteral feeding may be an alternative.[6] The exclusive use of human milk (HM) and the standardization of feeding practices may significantly improve feeding tolerance and reduce the incidence of NEC in VLBW infants. [7, 8]

Feeding intolerance is a common problem that arises in VLBW babies. This study was designed to know the incidence and different factors associated with feeding intolerance.

METHODOLOGY

This is a part of prospective hospital based observational study which was conducted in Universal College of Medical Sciences, Bhairahawa, Nepal, for a duration of 12 months (2019-2020) among preterm infants aged 28-34 weeks of Gestation. The study was conducted after approval by the Institutional Review Committee (UCMS/IRC/060/18). All babies with 28-34 weeks gestation admitted in NICU and postnatal wards (both in-born and out-born) were included after obtaining informed and written consent from the parents. In neonates less than 28 weeks of gestation there is no proper sucking effort and no propulsive motility in the gut .So neonates less than 28 weeks were excluded. In this study we included only very low birth weight babies (VLBW) weighing more than 1000 gm to less than 1500 gm. The neonates with intestinal congenital anomalies, fulminating sepsis and not willing to give consent were excluded.

All hemodynamically stable preterm babies were started on trophic feeds (10 mL/kg) as per the hospital protocol. Haemodynamically unstable babies were given fluid resuscitation along with inotropes and feed was started once inotropes were stopped. Feeding was started with either orogastric tube or katori spoon depending on the age of gestation of the babies as shown in [Fig-1]. Feeding was increased by 10-15 mL/kg/day till full feeds were reached. The feeding method used was calculated bolus feeds every 2 hourly. Human breast milk was used and if not available, preterm formula feed was used. Human milk fortifier was added to expressed breast milk once the feed volume reached 100 mL/kg/day, till the baby's weight reached 2000 gm. Gavage feeding was done by selecting soft orogastric tube (size- 5F external and approximately 0.05 cm internal diameter) with a rounded atraumatic tip and two holes on alternate sides. The length of tube was measured from bridge of nose to earlobe, then to the point halfway between the end of the sternum and the navel. The tube was inserted through nose/mouth by lubricating it with 2% xylocaine. The placement of the tube was confirmed by aspirating gastric content or injecting air bolus from free end and auscultating gushing sounds in epigastrium and tube was secured with tape. The free end of the tube has an adapter into which the tip of a syringe is fitted and a measured amount of feed was given by gravity. The feeding tube was not removed in between the feeds and was replaced by a new tube daily.



Study definitions: (a) Respiratory distress syndrome and other causes of respiratory distress were diagnosed based on gestational age, proper history and examination, history of administration of antenatal steroids and X-ray findings. The severity of respiratory distress was assessed using Silverman Score and score more than six was kept in Continuous Positive Airway Pressure (CPAP), Early rescue surfactant was administered in neonate on CPAP and need of more than 40% Fraction of inspired Oxygen (FiO2) and on mechanical ventilation with FiO2 more than 35%.[9](b) Apnea was diagnosed by cessation of breathing for longer than 20 seconds or for shorter duration in presence of bradycardia and/or change in skin colour (pallor or cyanosis). Apnea of prematurity was diagnosed after exclusion of secondary cause and was treated with methylxanthine.[10](c) Diagnosis of feeding intolerance: Presence of one or more signs leading to interruption of enteral feeding regime- more than 2 mL/kg gastric residue or more than 50% gastric residue of the previous feeding, greenish or haemorrhagic residue, vomiting (altered milk, bile or blood stained), abdominal distention (increase in abdominal girth by 2 cm or more in between feedings with or without visible bowel loops), bloody stools, visible bowel loops, reduced or absent bowel sounds, abdominal tenderness with systemic signs (cyanosis, bradycardia, apnea, etc.,)[11, 12]

Data was collected in predesigned performa and entered in Microsoft excel chart and analysis was done by using Statistical Package for the Social Sciences (SPSS) software, version 16.0 (SPSS Inc., Chicago, IL). The analysed data were expressed as frequencies, percentage, mean, percentile and Standard Deviation (SD). Chi-square test was applied for categorical variables. The p-value < 0.05 was considered as statistically significant.

RESULTS

The total number of deliveries during the study period was

7054; among them 1024 babies were preterm and 342 were born between 28-34 weeks of gestation. There were 148 babies admitted who were born outside and meet the inclusion criteria. Among the 490 babies, (148 born outside and 342 born inside), 207 were very low birth weight babies. (Table 1)

Table 1: Birth weight of total babies

Birth weight	Frequency (n) (%)
ELBW	06 (1.22)
VLBW	207(42.25)
LBW	270 (55.10)
NBW	07 (1.43)
Total	490 (100)

The mean gestation among 207 included babies (VLBW) was 31weeks ±3 days with mean weight of 1336 gm and 141 (68.11%) were delivered by vaginal delivery. Per vaginal leaking (50) was the most common co-morbidity in mother of very low birth weight babies. Very low birth weight (VLBW) babies were associated with one or the other neonatal morbidities in 130 (62.8%)cases, most common being respiratory distress which was present in 31 babies. (Table 2)

Table 2: Maternal and neonatal co-morbidities among VLBW babies

Maternal co - morbidities	Frequencies (n) (%)
Oligohydraminos	29 (14)
Per vaginal leaking	50 (24.15)
Pregnancy induced hypertension	45 (21.7)
Chronic medical illness	6 (2.8)
None	77 (37.19)
Total	207 (100)
Neonatal morbidity	**Frequency (n)**
Respiratory distress	31 (14.97)
Respiratory distress syndrome	25 (12)
Hypoxic ischemic encephalopathy (HIE)	7 (3.38)
Respiratory distress syndrome (RDS) + Apnoea + Shock	10 (4.88)
Necrotising enterocolitis (NEC)	6 (2.8)
RDS + Shock	12 (5.7)
Apnea	7 (3.3)
Jaundice	30 (14.4)
Seizure	2 (0.96)
None	77 (37.1)
Total	207 (100)

Out of the total 207 very low birth weight babies, 33 (15.9%), had feeding intolerance. Among them 25 (75.7%) was born in 28-32 weeks and 8 (24.3%) was born in 32-34 weeks of gestation. The mean gestation among feeding intolerance baby was 30 weeks ±2 days with mean weight of 1321 gm. Per Vaginal leaking of >18 hours, was most common co-morbidities in mothers of feeding intolerance babies and was present in 9 babies (27.2%). (Table 3)

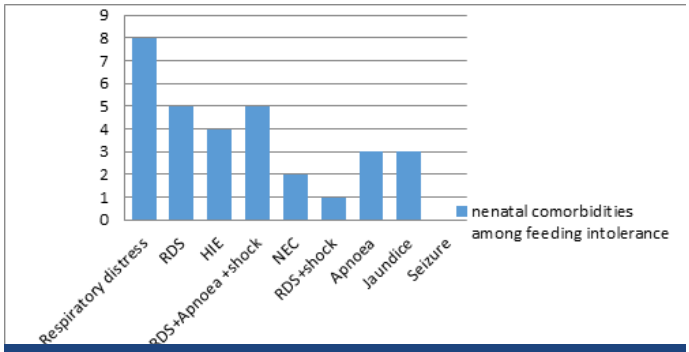


Fig 2: Neonatal comorbidities among feeding into lerance

Table 3: Maternal Co morbidities among feeding intolerance babies

Maternal co morbidities	Frequencies (n) (%)
Oligohydraminos	7 (21.2)
PV leak >18hrs	9 (27.2)
PIH	6 (18.18)
None	11 (33.33)
Total	33 (100)

Out of 33 feeding intolerant babies respiratory distress (24%) was the most common co morbidity present. (Fig 2)There were 69 one or more signs of feed intolerance in the 33 babies, of which vomiting was present 93.9% babies followed by gastric residue (54.5%), abdominal distension (48.4%), apnea (6%) and reduced or absent bowel sounds (3%). (Table 4)

Table 4: Signs of feeding intolerance

Signs of feeding intolerance	Frequency (n) (%)
Vomiting	10 (30.3)
Vomiting and abdominal distension	6 (18.18)
Vomiting and gastric residue	8 (24.2)
Vomiting, abdominal distension and gastric residue	4 (12.12)
Gastric residue and abdominal distension	2 (6.06)
Vomiting, abdominal distension, gastric residue, apnoea	2 (6.06)
Vomiting, abdominal distension, gastric aspirate, reduced/absent bowel sound	1 (3.03)
Total	33 (100)

Among 207 VLBW babies, 76 babies (36.7%) were fed after 24 hours, 134 (64.7%) were nulliparous and 141 (68.11%) were fed with breast milk. The incidence of feeding intolerance was increased in primiparous mothers, babies fed with formula feed and when feeding was started <24 hours but were statistically insignificant. (P value 0.79, 0.41 and 035 respectively) [Table 5]

Table 5: Relation between start of feeding, parity and feeding intolerance

	Feeding intolerance		Total	Significance (P value)
	Present n (%)	Absent n (%)		
Feeding Start				
>24 hours, <24 hours Total	13 (39.39) 20 (60.6) 33 (100)	63 (36.2) 111 (63.79) 174 (100)	7[6 131 207	0.35
Parity of mother before birth				
Nulliparous Multiparous Total	21 (63.6) 12 (36.36) 33 (100)	113 (64.9) 61 (35.05) 174 (100)	134 73 207	0.79
Type of feeding				
Breast milk Formula feed Total	5 (15.15) 28 (84.84) 33 (100)	136 (78.16) 38 (21.8) 174 (100)	141 66 207	0.41

DISCUSSION

The study population included preterm infants born between 28-34 weeks of gestation (who were fed by gavage, katori spoon or were on intravenous fluids initially). Feeding intolerance is a common complication in VLBW babies with an incidence of 15.9% in this study. Respiratory distress (24%) was the most common co morbidity present. The incidence of feeding intolerance was increased in primiparous mothers, formula fed newborns and those who started feeding within 24 hours of birth.

There is large variation on the incidence of feeding intolerance from one study to another. The incidence of feeding intolerance in study done by Zhen Tang et al. was 76.4% in VLBW babies. Simple gastric retention (47.2%) was found as the most common clinical manifestation where as vomiting was the most common symptom in this study.[13] Other study also showed the similar incidence feeding intolerance in about 75% of VLBW babies.[14] The low incidence of feeding intolerance in the present study could have been due to the protocol based feeding practices in the setting and partly may be due to exclusion of preterm infants below 28 weeks in these studies where as our study involved babies above 28 weeks only.

The mean gestation among feeding intolerance baby was 30 weeks ±2 days with mean weight of 1321 gm. Study done by Zoppelli et al. showed that mean GA was 28.5 weeks and birth weight 1057 gm.[15] In another study done by Albanna et al. showed that they had a mean GA of 32 weeks, a mean birth weight of 1500 gm.[16]

In this study most common symptom of feeding intolerance was vomiting whereas study done by Kayastha P et al. had abdominal distension.[17] Necrotizing enterocolitis was found in about 1.83% of feeding intolerant babies in this study which was less than 5% found in the study done by Kol ezko B et al.[18]

Feeding intolerance is associated with several neonatal co-morbidities. It includes respiratory distress, apnea, shock, necrotizing enterocolitis, respiratory distress syndrome among others.[6, 7, 13]

CONCLUSION:

Feeding intolerance is a common problem in preterm very low birth weight babies (VLBW) with incidence of 15.9%. Vomiting along with gastric residue and abdominal distension are common symptoms of feeding intolerance. Babies who were formula fed and feeding started within 24 hours are related to increased incidence of feeding intolerance.

The findings of this study suggest that, ideally, we should not interrupt the flow of nutrition that the fetus has been obtaining from its mother and not hesitate to provide nutrition to the infant immediately after birth.

LIMITATIONS OF THE STUDY

This study involved very low birth weight babies (VLBW) from 28-34 weeks. The result would have been different if VLBW babies less than 28 weeks had been taken. There were 33 babies with feeding intolerance so the number is less to analyze for conclusive evidence which require further large multicentre studies. This was a prospective observational study. Comparative observational study could have been done.

ACKNOWLEDGEMENT

We would like to acknowledge all the health professionals and babies who are involved in this study, without them this study wouldn't have been possible.

CONFLICT OF INTEREST

There is no conflict of interest.

FINANCIAL DISCLOSURE

None

REFERENCES

1. Moutquin JM. Classification and heterogeneity of preterm birth. BJOG An Int J Obstet Gynaecol. 2003;110 (SUPPL. 20): 30–3. DOI: 10.1046/j.1471-0528.2003.00021.x
2. Simmons LVE, Rubens CE, Darmstadt GL, Gravett MG. Preventing Preterm Birth and Neonatal Mortality: Exploring the Epidemiology, Causes, and Interventions. Semin Perinatol [Internet]. 2010;34(6):408–15. DOI: 10mperi.2010.09.005.1053/j.se
3. Battersby C, Longford N, Mandalia S, Costeloe K, Modi N. Incidence and enteral feed antecedents of severe neonatal necrotising enterocolitis across neonatal networks in England, 2012–13: a whole- population surveillance study. Lancet Gastroenterol Hepatol. 2017; 2 (1):43–51. DOI: 10.1016/S2468-1253(16)30117-0
4. Khashana A, Moussa R. Incidence of feeding intolerance in preterm neonates in neonatal intensive care units, Port Said, Egypt. J Clin Neonatol. 2016;5(4):230-2. DOI: 10.4103/2249-4847.194165

5. Sharma R, Hudak ML, Tepas JJ, Wludyka PS, Marvin WJ, Bradshaw JA, et al. Impact of gestational age on the clinical presentation and surgical outcome of necrotizing enterocolitis. J Perinatol. 2006; 26 (6): 342–7. DOI: 10.1038/sj.jp.7211510

6. Ramani M, Ambalavanan N. Feeding practices and necrotizing enterocolitis. Clin Perinatol. 2013 Mar; 40 (1): 1-10. doi: 10.1016/j.clp.2012.12.001. Epub 2013 Jan 17. PMID: 23415260

7. Patole SK, de Klerk N: Impact of standardised feeding regimens on incidence of neonatal necrotising enterocolitis: a systematic review and meta-analysis of observational studies. Arch Dis Child Fetal Neonatal Ed 2005; 90: F147–F151. DOI: 10.1136/adc.2004.059741

8. Dsilna A, Christensson K, Alfredsson L, Lagercrantz H, Blennow M: Continuous feeding promotes gastrointestinal tolerance and growth in very low birth weight infants. J Pediatr 2005; 147: 43–49. DOI: 10.1016/j.jpeds.2005.03.003

9. Slocum C, Arko M, Di Fiore J, Martin RJ, Hibbs AM. Apnea, bradycardia and desaturation in preterm infants before and after feeding. J Perinatol. 2009 March ; 29(3): 209–12. DOI: 10.1038/jp.2008.226

10. Dutta S, Singh B, Chessell L, Wilson J, Janes M, McDonald K, et al. Guidelines for feeding very low birthweight infants. Nutrients. 2015 Jan 8; 7(1):423–42. DOI: 10.3390/nu7010423

11. Yee WH, Soraisham AS, Shah VS, Aziz K, Yoon W, Lee SK. Incidence and Timing of Presentation of Necrotizing Enterocolitis in Preterm Infants. Pediatrics. 2012 Feb 1; 129 (2):e298–304. DOI: 10.1542/peds.2011-2022

12. World Health Organization, editor. International Statistical Classification of Diseases and related health problems: Alphabetical index. World Health Organization; 2004.

13. Moore TA, Wilson ME. Feeding intolerance: A concept analysis. Advances in Neonatal Care. 2011 Jun 1; 11 (3): 149-54. DOI: 10.1097/ANC.0b013e31821ba28e

14. Tang Z, Zhou Y, Li MX. Clinical features of feeding intolerance in preterm infants. Zhongguo Dang dai er ke za zhi= Chinese Journal of Contemporary Pediatrics. 2011 Aug 1; 13 (8): 627-30. PMID: 21849110

15. Zoppelli L, Güttel C, Bittrich HJ, Andrée C, Wirth S, Jenke A. Fecal calprotectin concentrations in premature infants have a lower limit and show postnatal and gestational age dependence. Neonatology 2012; 102: 68-74. DOI: 10.1159/000337841

16. Albanna EA, Ahmed HS, Awad HA. Stool calprotectin in necrotizing enterocolitis. J Clin Neonatol 2014; 3: 16-9. DOI: 10.4103/2249-4847.128721

17. 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. JNMA J Nepal Med Assoc. 2022 Nov 2; 60 (255): 952-954. DOI: 10.31729/jnma.7826

18. Koletzko B, Poindexter B, Uauy R (eds): Nutritional Care of Preterm Infants: Scientific Basis and Practical Guidelines. World Rev Nutr Diet. Basel, Karger, 2014, vol 110, pp 201–214. DOI: 10.4103/0971-5916.184296