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The Study of Early Feeding In Very Low Birth Weight Neonates in a Tertiary Care Centre

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Abstract

Introduction

The incidence of low birth weight neonates in India varies between 25-30 percentage.Very low birth weight (VLBW) babies comprise between 4-8% of live-births. These babies are at a high risk for morbidity and account for one third of mortality in neonatal age group.

Optimal nutrition in these newborns improves growth and good neurological outcomes and also reduces morbidity and mortality . There is a great deal of heterogeneity of practice among neonatologists regarding feeding VLBW infants. Adequate nutrition is essential for the optimal growth and health of very low birth weight (VLBW) infants. Enteral nutrition is preferred to total parenteral nutrition (TPN) because the former avoids complications related to vascular catheterization, sepsis, adverse effects of TPN, and fasting. Early parenteral nutrition in these babies remains critical and should be used as an adjunct to enteral nutrition. The overarching goal while feeding VLBW infants (VLBWI) is to reach full enteral feeding in the shortest time, while maintaining optimal growth and nutrition and avoiding the adverse consequences of rapid advancement of feeding.

Various comorbidities like hypoglycemia, hypothermia, infections, respiratory distress syndrome, necrotising enterocolitis,intraventricular hemorrhage and abnormal Doppler studies in very low birth weight babies can pose a challenge in their feeding practices.

Aims and objectives

1)To study the feeding patterns of very low birth weight babies

2) To study the outcome of early initiation of feeding in very low birth weight babies

Methodology

It is a prospective observational study done at the tertiary hospital, civil hospital Ahmedabad during a period of 1/3/21 to 31/7/21. Total 50 very low birth weight neonates admitted in NICU were enrolled in the study after taking consent from their guardians.They were observed for feeding patterns during their stay in NICU.

Results

70.2% of very low birth weight babies received early initiation of feeding within 24 hrs of birth, out of which 51.5 % received full feeds on the first day itself. 41.7% babies achieved an average weight gain of 15-20 gm/ day while 37.5% babies had average weight gain of 10-15gm/day. Very low birth weight babies in whom early feeding was started ,68.6 % required no antibiotics, 81.2% developed no feeding intolerance and 72.5% were discharged after establishment of breast feeding.

Conclusion

Early initiation of feeding in very low birth weight babies can improve growth and decrease risks associated with parenteral nutrition thereby decreasing morbidity and stay of neonates in NICU.

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I. Introduction

According to WHO definition, the very low birth weight babies comprise birth weight less than 1500 gm and extremely low birth weight babies comprise birth weight less than 1000 gm. Significant growth and weight gain occurs during the last trimester of pregnancy, predisposing these babies to a lower nutritional status compared to full term babies.Postnatal growth varies from intrauterine growth in that it begins with a period of weight loss, primarily through the loss of extracellular fluid. The typical postnatal weight loss in the term infant is 5% to 10% of birth weight. Historically, in preterm infants, this postnatal weight loss can be as much as 15% of birth weight, with the nadir by 4 to 6 postnatal days and a regain to birth weight by 14 to21 days. This

postnatal weight loss pattern, however, can be attenuated in most preterm infants with optimized, early nutrition.Goals for weight gain are 15 to 20 g/kg/day for infants <2 kg and 20 to 30 g/day for larger infants. [1-5]

Nutritional management influences immediate survival as well as subsequent growth and development of LBW infants. Even simple interventions such as early initiation of breastfeeding and avoidance of prelacteal feeding have been shown to improve their survival in resource restricted settings.Early nutrition could also influence the long term neurodevelopmental outcomes and reduce the average stay in hospital.

FEEDING OF VLBW :- HOW IS IT DIFFERENT?[1-5]

1. A significant proportion are born premature with inadequate feeding skills. They might not be able to breastfeed and would require other methods of feeding such as spoon or gastric tube feeding.
2. These infants are prone to have significant illnesses in the first few weeks of life; the underlying condition often precludes enteral feeding.
3. Preterm very low birth infants (VLBW) infants have higher fluid requirements in the first few days of life due to excessive insensible water loss.
4. Since intrauterine accretion of nutrients occurs mainly in the later part of the third trimester, VLBW infants (usually born before 32 weeks gestation) have low body stores at birth. Hence, they require supplementation of various nutrients. Even term LBW infants who are likely to be growth restricted need higher calories for 'catch-up' growth.
5. Because of the gut immaturity, they are more likely to experience feed intolerance necessitating adequate monitoring and treatment.

Maturation of feeding skills and choice of initial feeding method

Gestational age	*Maturation of feeding skills*	*Initial feeding method*
< 28 weeks	No proper sucking efforts No propulsive motility in the gut	Intravenous fluids
28-31 weeks	Sucking bursts develop No coordination between suck/swallow and breathing	Oro-gastric (or naso-gastric) tube feeding with occasional spoon/*paladai* feeding
32-34 weeks	Slightly mature sucking pattern Coordination between breathing and swallowing begins	Feeding by spoon/*paladai*/cup
>34 weeks	Mature sucking pattern More coordination between breathing and swallowing	Breastfeeding

All stable LBW infants, irrespective of their initial feeding method should be put on their mothers' breast. The immature sucking observed in preterm infants born before 34 weeks might not meet their daily fluid and nutritional requirements but helps in rapid maturation of their feeding skills and also improves the milk secretion in their mothers ('Non-nutritive sucking').

PROGRESSION OF ORAL FEEDS

All VLBW infants, irrespective of their gestation and birth weight, should ultimately be able to feed directly from the mothers' breast.Term LBW infants started on IV fluids (because of their sickness) can be put on the breast once they are hemodynamically stable.

CHOICE OF MILK FOR VLBW BABIES

All LBW infants, irrespective of their initial feeding method should receive ONLY breast milk. This can be ensured even in those infants who are fed by paladai or gastric tube by giving expressed breast milk (mothers' own milk or human donor milk).

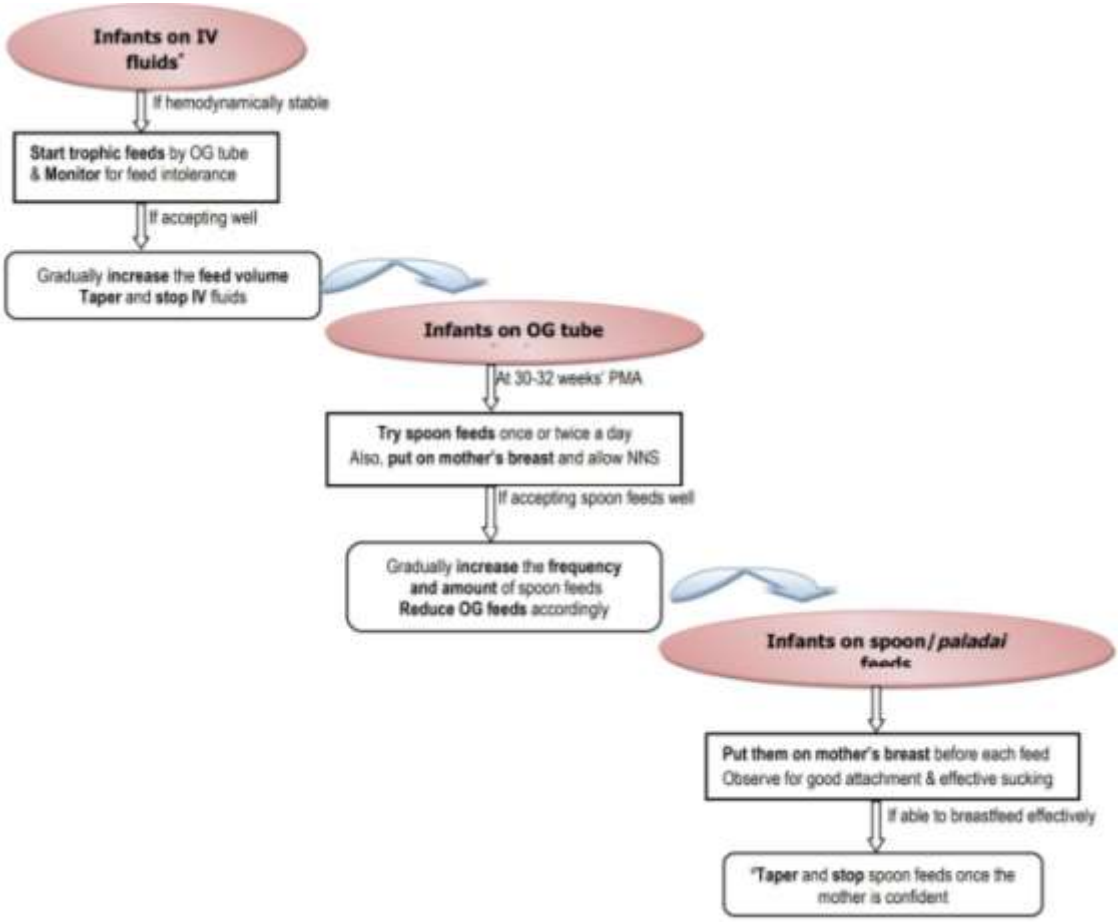
Expressed breast milk (EBM)

All preterm infants' mothers should be counseled and supported in expressing their own milk for feeding their infants. Expression should ideally be initiated within hours of delivery so that the infant gets the benefits of feeding colostrum. Thereafter, it should be done 2-3 hourly - this would ensure that the infant is exclusively breastfed and also helps in maintaining the lactation in the mother. Expressed breast milk can be stored for about 6 hours at room temperature and for 24 hours in the refrigerator.

Donor human milk

In centers where optimal milk banking facilities are available, donor human milk can be used for feeding a LBW infant. At present, only a few centers in India have standardized human milk banking facilities.

Sick mothers/ contraindication to breastfeeding
In these rare circumstances, the options available are
1. Formula feeds:
a. Preterm formula – in VLBW infants and
b. Term formula – in infants weighing >1500g at birth
2. Animal milk: e.g. undiluted cow's milk
Once the mother's condition becomes stable (or the contraindication to breastfeeding no longer exists), these infants should be started on exclusive breastfeeding.



II. Aims And Objectives

1) To study the feeding patterns of very low birth weight babies
2) To study the outcome of early initiation of feeding in very low birth weight babies

III. Materials And Methodology

1) Design: Prospective observational type of study
2) Participants: 50 very low birth weight babies (<1500gm)admitted in NICU at Civil Hospital Ahmedabad
3) Study period: 1/3/2021 to 31/7/2021
4) Consent: After taking informed consent from parents/guardians, patients were enrolled in the study

5) Methodology:-
50 newborns(22 inborn and 28 outborn) were observed since day one of admission and feeding was started according to the FBNC protocols(facility based newborn care) in accordance to their gestational age and weight .The amount of feeding , mode of feeding and type of milk given were noted.The babies were started on preferably expressed breast milk , if it not available, formula feed was started. The babies were observed for feeding intolerance. Feeding intolerance was considered if there was repeated vomiting, an increase in the abdominal girth by >2 cm associated with a RT aspirate of >50% of the given feed. Many extremely low birth weight babies were started on minimal enteral nutrition and feeding was gradually increased.Various morbidities in these babies as well as need of antibiotics was studied too.

INCLUSION CRITERIA
Neonates with birth weight less than 1500gm(very low birth weight according to WHO definition) admitted in Civil hospital Ahmedabad in neonatal intensive care unit

EXCLUSION CRITERIA
1) Neonates with birth weight of more than 1500 gm
2) Neonates who took leave against medical advice

IV. Discussion

The study was carried out at NICU Civil Hospital , Ahmedabad . Fifty very Low Birth weight babies were observed during their entire admission time for feeding patterns. 47.9% of them were females and 52.1% were males. Outborn babies accounted for up to 56.3%.

The study comprised 14% of Extremely low birth weight babies(<1000 gm). The rest 86% weighed between 1000 gm to 1500gm. Out of this 70.8% babies were started on feeds on the first day of life while 29.2% received parenteral nutrition.

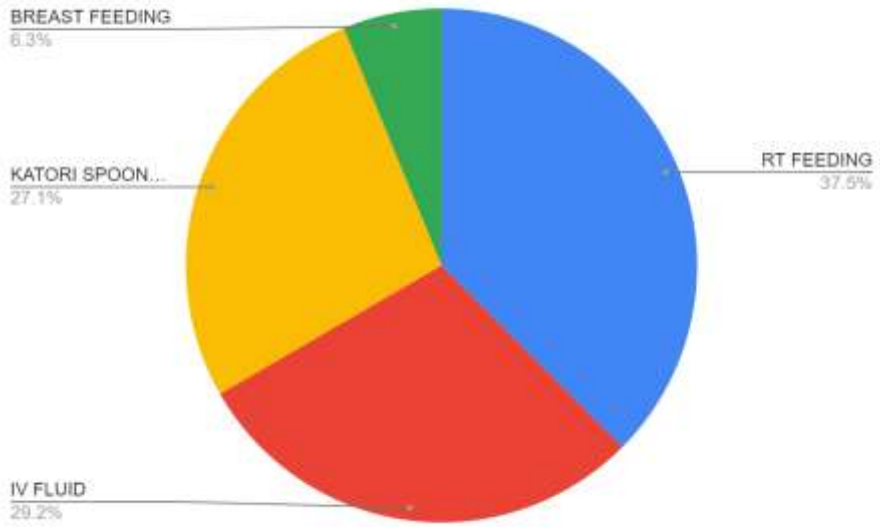


FIGURE 1. FORM OF NUTRITION THE VERY LOW BIRTH BABIES WERE GIVEN ON DAY 1 OF ADMISSION

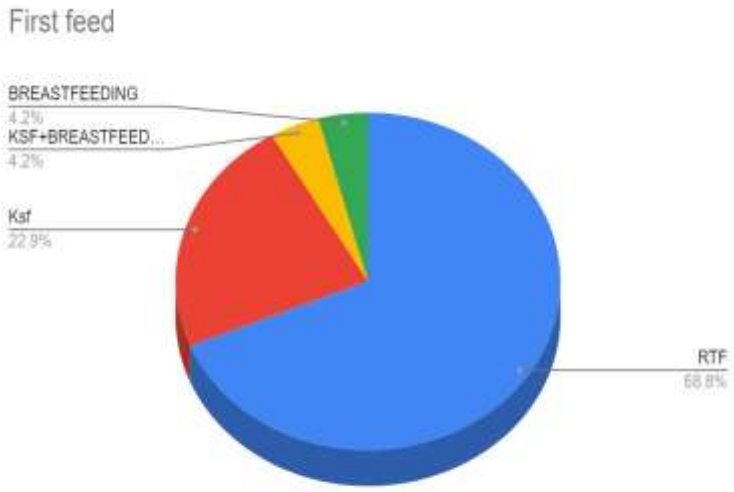


FIGURE 2. THE MODE OF ENTERAL FEEDS GIVEN IN BABIES STARTED ON FEEDS ON DAY 1

Out of all the very low birth weight babies started on feeding in the first 24 hours, 68.8% were started on gavage feeding,22.9% on katori spoon feeding and 4.2% on breast feeding alone.89.28% of the babies who received gavage feeding were extremely low birth weight babies.

NEONATES	FEEDING STARTED ON DAY 1	FULL FEEDS ON DAY 1	FEEDING INTOLERANCE
INBORN	15(68%)	10(42%)	5(22%)
OUTBORN	17(57%)	8(28%)	8(28%)

TABLE.1 FEEDING IN STUDY POPULATION AND FEEDING INTOLERANCE

FEEDING INTOLERANCE	NUMBER OF INBORN NEONATES	NUMBER OF OUTBORN NEONATES
ABDOMINAL DISTENSION	**2**	**3**
VOMITING	**2**	**3**
NECROTISING ENTEROCOLITIS	**1**	**2**

TABLE 2 . FEEDING INTOLERANCE IN STUDY POPULATION

54.2% babies of the ones started on feeds were started with full feeds on day 1 of life, out of these 41.5% had a birth weight of more than 1000gm. Out of these babies 54% received expressed breast milk. 35.4% babies were started on Minimal Enteral Nutrition (20 ml/kg/day) ,10.4% on Minimal enteral nutrition(30 ml/kg/day) ,out of these 28.3% were Extremely low birth weight babies(<1000gm).

Sepsis is a major comorbidity in very low birth weight babies. 42% of babies did not receive any intravenous antibiotics during their stay. Out of the 29 babies that received antibiotics , 16 were extremely low birth weight babies.

The average weight gain from admission up to discharge in these babies was 173.25 gm.

The average weight for ELBW being 19.2 gm/day and 22.4gm/day for VLBW babies.the average weight gain of babies on gavage feeds was 18.2gm/day, on katori spoon feeds 17.4gm/day and 21.3gm/day on breast feeds.

The babies in whom early feeding was started 58% developed no signs of any feeding intolerance.10% developed abdominal distension,12% developed vomiting and 4% developed necrotising enterocolitis. Out of the two babies that developed necrotising enterocolitis

One was given exclusive breast feeding and weighted <1000 gm ,the second baby was given formula feed and weighted <1500gm.[6-13]

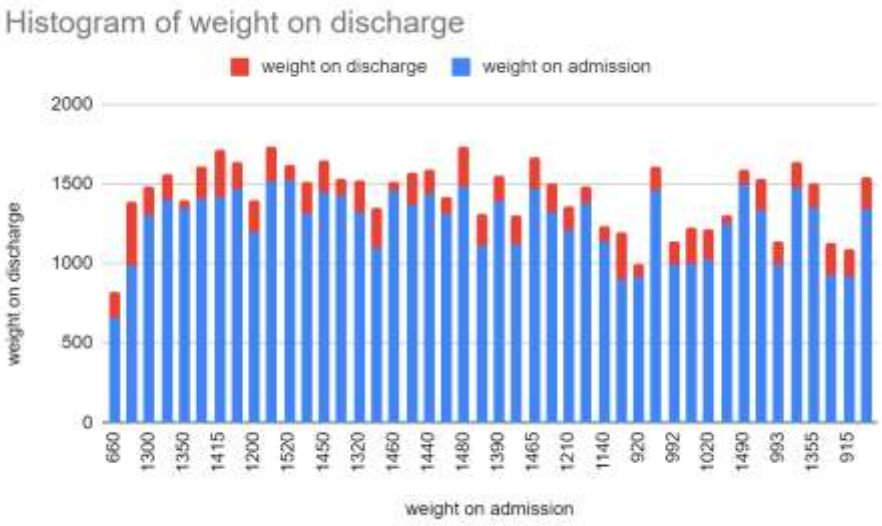


FIGURE 3. WEIGHT GAIN SINCE ADMISSION IN STUDY POPULATION

The average stay of neonates in whom feeding was started on the first day and developed no feeding intolerance was 10.2 days. The average stay of neonates who developed feeding intolerance after starting feeds was 14.6 days. The average stay of neonates in whom feeding was not started first day , the average stay of neonates came out to be 13.5 days.

[6]A similar study conducted at Cloudnine Hospital, Bangalore, Karnataka, India and KEM hospital]Mumbai concluded that early enteral feeding does not carry any additional risk of NEC in preterm infants; on the contrary, it aids in the development of the gut and reduces the risk of infections.[7]A similar study done in Division of Neonatology, Department of Pediatrics, Medical University of South Carolina on 603 very low birth weight babies and findings were that early EF was significantly associated with decreased NEC or death (6.3 vs 15.1%) (RR, 95% CI=0.28, 0.13-0.58) and less parenteral nutrition days ($p<0.0001$). Another study done at Division of Neonatology,[8] Department of Pediatrics, McMaster University Children's Hospital, Hamilton, also concluded that on comparing minimal enteral feeding and no enteral feeding for five days, there was no difference in the rate of NEC ($p = 0.76$) and there was a trend towards shorter NICU stay in the enteral feeding group ($p = 0.2$) .

V. Conclusion

1) Very Low birth weight infants should be given enteral feeds, preferably expressed breast milk, starting from the first day of life.
2) The benefit of starting even minimal enteral nutrition helps in priming the gut,reducing risk of infection ,reduces the number of days of parenteral nutrition and overall reduction in NICU stay of the baby.
3) Optimal nutrition improves growth and neurological outcomes, and reduces the incidence of sepsis
4) Benefits outweigh the risk of starting early feeds in very low birth weight babies , thus early initiation of feeding and strict monitoring for any signs of feeding intolerance should be done.

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