



Breast Milk for the Preterm and LBW : *Challenges and Solutions*

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Variations in breastfeeding rates for very preterm infants between regions and neonatal units in Europe: results from the MOSAIC cohort

Mercedes Bonet ADC2011

- Varied from 19% to 70%
- Correlated with national breast feeding rates
- Women were more likely to breast feed if they were older or primiparous
- More premature, smaller and multiple babies or those with BPD dysplasia were breast fed less.
- Variations across regions and neonatal units remained statistically significant after adjusting for maternal, infant and unit characteristics



Do we need breast milk for the preterm?

- Protection against infection
- Protection against NEC
- Appropriate lipid profile
- Better cognitive development
- Better visual development
- Involves the mother in the care of her baby

- Premature babies need the benefits of breast milk even more than term



Formula feeds

- No trophic factors : epidermal growth factor, nerve growth factor, insulin-like growth factor etc, etc
- Long chained polyunsaturated fatty acids (PUFA's) are likely not added in proper amounts
- Bioavailability of many elements poor



The Challenges

- Breast milk output is low
- Breast milk may not be nutritionally adequate

Why breast milk output is low?

- Delayed initiation
- Poor and ineffective sucking/ expression
- Irregular sucking/expression
- Maternal anxiety/stress
- Hostile NICU environment (incubators, ventilators, alarms)
- Unfriendly staff - lack of guidance/counseling
- Use of formulas in NICU
- Lack of rest / inadequate diet for mother



Attitudes in NICU

- Question of life and death--Saving life most important—breast milk feeding can wait
- Breast milk feeding also saves lives ! —so it is complementary, synergistic
- Saving baby's life by technology and helping mother to feed have same goals

Requirements for a preterm

ESPGHN2010

Calories	110-135
Protein < 1 kg	4.0-4.5
1-1.8 kg	3.5-4.0
Fat	4.8-6.6
Carbohydrate	11.6-13.2
Sodium	69-115
Potassium	66-132
Calcium	120-140
Phosphate	60-90



Apparent deficiencies of breastmilk

- Not enough protein to support the growth of the premature baby
- Insufficient calcium, phosphorus and vitamin D
- Insufficient calories for intrauterine growth rate
- Intolerance of some babies to lactose ; **BUT**
- Prematurity ranges from 26 weeker 800 grams to 33 weeks, 1500 grams
- Both cannot be treated similarly

Composition of very preterm breast milk

Bauer et al. Clin Nut2011

	< 28 weeks	28-31 weeks	32-33 weeks	Term
Protein	2.3	2.1	1.9	1.6
CHO	7.6	7.5	7.5	6.2
Fat	4.4	4.4	4.8	4.1
Energy	78	78	77	68
Sodium	10.6	10.6	10.4	11.2
Potassium	14.0	13.1	12.1	11.5
Calcium	6.2	6.5	7.4	5.4
Phosphate	2.2	2.1	2.0	1.9



Composition of very preterm breast milk

Bauer et al. Clin Nut 2011

- Protein content varied from 2.7-3.0 g/dL for 24-25 weekers to 1.8-2.3 g/d for 32-33 weekers
- Protein content keeps decreasing by 0.12 g/dL/week
- CHO and fat content increased with lactation weeks
- Very variable composition from mother to mother



Solutions for Low Milk output

- Early initiation of suckling/ expression
- Regular suckling/expression from day 1
- 24 hour access for mother
- Expression by Pumps (Manual with Mechanical)
- Breast milk expression room
- Friendly environment , friendly nurses, counselors and doctors
- Lactation support staff 24x7
- Development of sucking---oral stimulation programs, NNS , KMC

Alternatives/ Complements to incubator care

Bergman NJ et al. *Acta Paediatr* 2004

- Early Skin to skin contact –KMC
- 1200-2199 gram newborns.

	SSC(n=20)	Incubator (n=14)
NICU Transfer	2	1
Abnormal parameters	3	12
Hypothermia	1	8
Hypoglycemia	1	3



Kangaroo Mother Care

- Better mother-infant bonding
- Greater likelihood of full breastfeeding in hospital and at discharge
- Current Practices---used for short durations, started late



Solutions for Low Milk output

- Facility for storing milk
- Avoid bottles; use spoon feeding / cup feeding/finger feeding
- Galactagogues ? ?
- Milk Banking



Handling the expressed milk

- Best to use freshly expressed milk
- Refrigerated better than frozen
- Even if you lose some bio growth factors, there are none in formula !
- Glass and hard plastic preferred containers



Solutions for nutritional inadequacy

- Increase administered volume
180-200 ml/kg/d 250-300 ml/kg/d
- Ensure hind milk is given
- Fortification
- Accept lower growth !



Intrauterine growth rate

- Besides being academically satisfying, is there any evidence that a baby is better off growing at intrauterine growth rates?
- The physiologic situation is completely different for a baby outside the uterus
- There are advantages of exclusive breastmilk feeding that go beyond growth rate

Is more initial weight gain better?

Singhal A, Lucas 2004

- LDL : HDL cholesterol ratio was significantly lower in adolescents who had been randomised to bank breastmilk compared with those who received preterm formula
- CRP concentration was also significantly lower in adolescents randomised to banked breastmilk compared with preterm formula
- Lower BP



Is more initial weight gain better?

Bishop 1996

- Compared banked donor milk vs preterm formula as a supplement to mother's breast milk in 54 children aged five years
- “Increasing human milk intake was strongly positively associated with later bone mineral content



The apparent breastfeeding paradox in very preterm infants: relationship between breast feeding, early weight gain and neurodevelopment based on results from two cohorts, EPIPAGE and LIFT

Roze BMJ Open 2012

- Gestational age 29.9 weeks, birth weight 1380 gms
- Breast feeding was associated with decreased risk of suboptimal neurodevelopmental outcome at 2 and 5 years of age.
- Increased risk of losing 1 weight Z score during hospitalization



The apparent breastfeeding paradox in very preterm infants: relationship between breast feeding, early weight gain and neurodevelopment based on results from two cohorts, EIPAGE and LIFT

Roze BMJ Open 2012

- From 2 years of age, weight, HC and height were higher in those breast fed at discharge
- Increased chance of having a head circumference Z score higher than 0.5 at 5 years



Standard vs Individualized Fortification

- Standard fortification assumes same composition for all mothers on all days and at all times
- Individual assessment of milk composition – how?
 - Creamatocrit
 - Protein??
- Even if you can assess, availability of suitable component fortifiers



Colostrum use in preterm

- Should be provided as soon as possible
- Even few drops may be beneficial, by “priming” the baby’s gut and giving protective antibodies
- Can be tolerated even by the smallest and sick baby
- Sends a very strong message



Conclusions

- Challenges exist --but so do solutions
- Concept of intrauterine growth needs a re-look
- Require change in mindset and simple innovative solutions
- Use individualized fortification and as a drug—on prescription

Thank You so much...