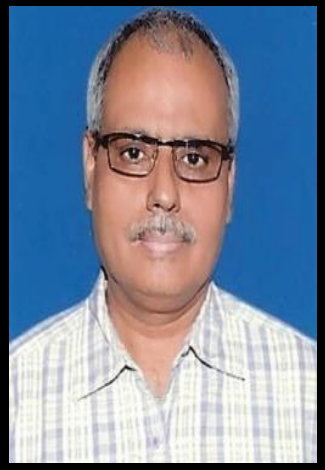
FEEDING OF LOW BIRTH WEIGHT BABIES



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INTRODUCTION

- LBW—birth weight <2500gm[2499 or less]
- Globally about 18million are born with birth weight of less than 2500 every year constitute 14% total live birth but they accounts for 60-80% total neonatal death.
- Results from either preterm birth[<37wks GA] or small for gestational age or IUGR babies [wt. for gestation is <10th centile.
- About 60% of LBW are IUGR and 40% are preterm.
- About 25-30% of the babies are low birth weight in India accounts for 42% global burden largest for any country.
- Source: journal of perinatology published on dec 2016.

CLASSIFICATION OF LBW,PRETERM & IUGR

- Classification of lbw

Low birth weight-less than 2500gm

Very low birth weight – less than 1500gm

Extremely low birth weight –less than 1000gm

Preemie baby-less than 750gm

- PRETERM [<37weeksGA]

[Classification of preterm based on gestational age]

early preterm- less than 28weeks

mid preterm – 28 to 31 weeks

delayed preterm -32 to 36 weeks.

IUGR CLASSIFICATION

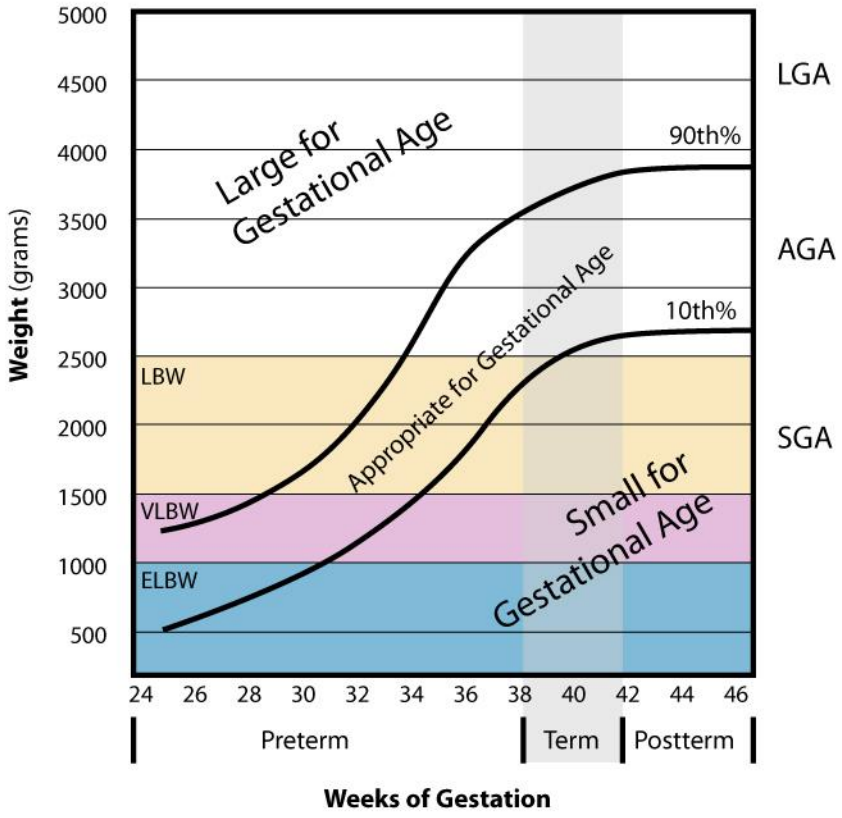
Symmetric IUGR:

- results when insult on the fetal growth occurs early.
- The size of head, body weight and length are equally reduced.
- Causes include genetic , chromosomal disorders and congenital infections.

Asymmetric IUGR

- Results when insult on fetal growth occurs late producing brain sparing effect.
- Head circumference is preserved compared to length and weight
- Causes includes placental insufficiency, PIH or maternal medical disorders.

GRAPHICAL REPRESENTATION OF GESTATIONAL AGE.



CAUSES OF LBW

- MATERNAL CAUSES
  - Maternal malnutrition
  - multiple pregnancy
  - elderly gravida
  - chronic illness in mother
  - infections during pregnancy
  - illiteracy and poverty

FETAL CAUSES

fetal distress

twin baby

placental defect

PROBLEMS OF PRETERM AND SGA [EVEN THOUGH PROBLEMS OF PRETERM AND IUGR ARE SLIGHTLY DIFFERENT BUT MANAGEMENT ARE COMMON.]

PRETERM

- Birth asphyxia
- Resp distress.
- Hypothermia
- Food intolerance
- Apneic spells
- Poor weight gain
- Hyperbilirubinemia

SGA/IUGR

- Hypothermia
- Hyperbilirubinemia
- Bacterial sepsis
- polycythemia
- Hypoglycemia
- Metabolic acidosis

FEEDING IN LBW HOW ITS DIFFERENT?

- Inadequate feeding skills.
- Prone to illness-prematurity.
- Higher fluid requirements in VLBW d/t insensible water loss-- higher feed.
- Gut immaturity.
- Low body stores of micronutrients.

PROTOCOL FOR FEEDING

- Deciding the initial method of feeding in given LBW infant.
- For infants initiated on modes other than breastfeeding:

  How to progress to breast feeding?

  what milk to be given?

  how much milk to be given?
- What supplements are required?
- How to asses feeding adequacy monitor the growth.
- How to identify and manage feed intolerance.

WHAT TO FEED ?

- Mother's own milk is best for all LBW babies ,all stable LBW babies irrespective of their GA & Birth weight, initial feeding method should be mother's breast milk.
- Expressed breast milk.
- Donor breast milk.
- Standard infant formula

Preterm formula and Human milk fortifier < 1500 gms & continued up to 2000 gm achieved.

- Animal milk [mainly cow's milk and buffalo's milk] in the circumstances where human milk is not available. But this practice is absolutely discouraged.

DECIDING THE INITIATION OF BREAST FEEDING.

Is the baby stable?

- fast breathing [>60/min]
- Severe chest in drawing
- Apneic spells
- Convulsions
- Abdominal distension with dark coloured or brown aspiration
- Shock
- Presence of any of these above signs indicates baby is not stable and these babies should start iv fluids.

INITIAL FEEDING METHOD IN LBW BABIES

- <28 weeks [<1200g]and very sick baby- intial feed is intravenous fluid

  inadequate sucking and lack of gut motility

- 28 to 31 weeks[1200-1500g]—feeding by orogastric or NG tube.

  Sucking burst develops but poor co-ordination between sucking and swallowing

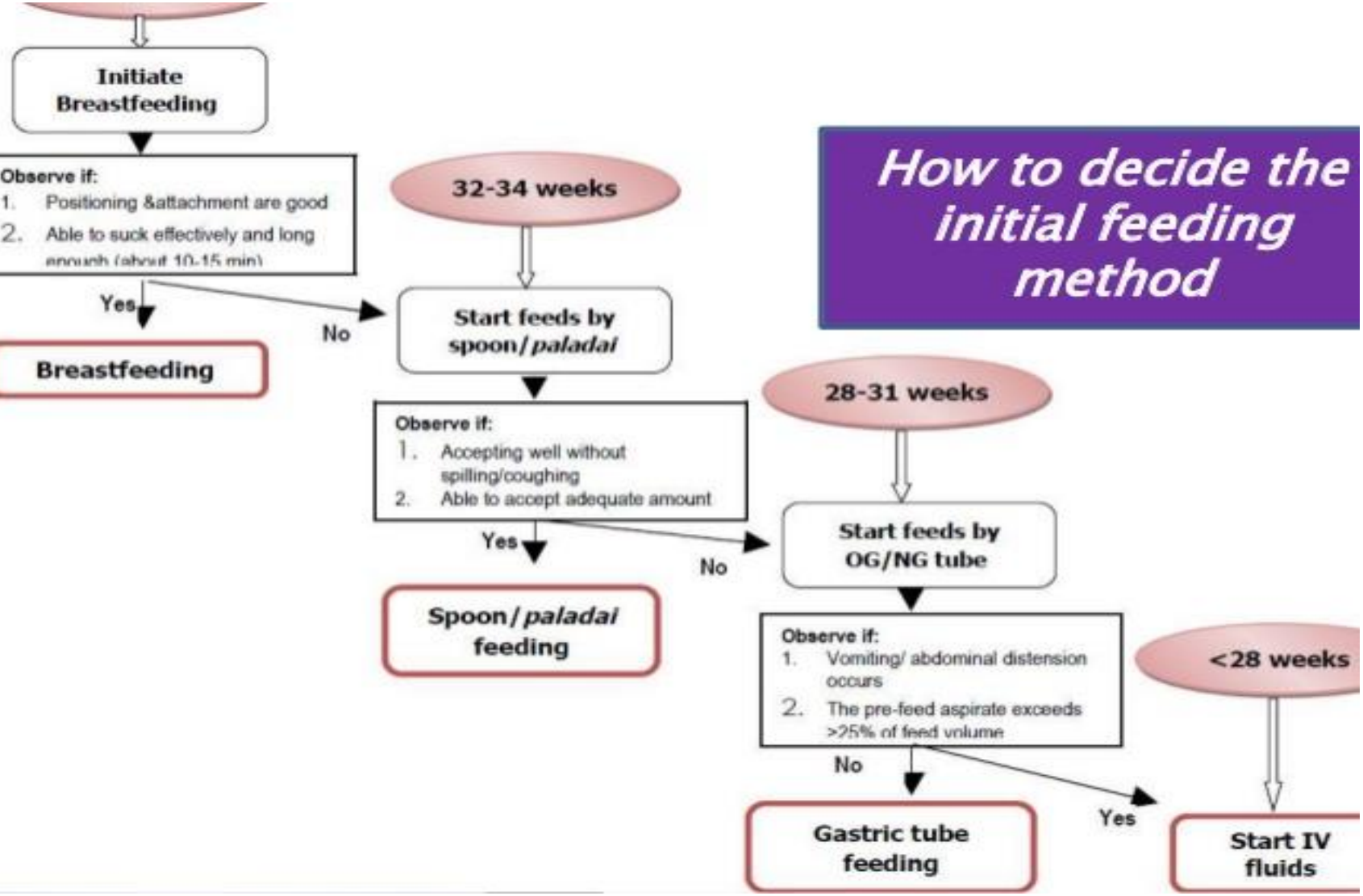
- 32 to 34 weeks[1500-1800g]—feeding by spoon or paladai

Slightly mature sucking pattern with good co-ordination of sucking and swallowing.

- >34 weeks[>1800g]- breast feeding

  mature sucking pattern with co-ordination between breathing and swallowing.

FLOW CHART TO ILLUSTRATE HOW TO INITIATE FEEDING.



IV FLUIDS CONTD

- The initial fluid of choice is 10% dextrose to maintain glucose rate 4-6mg/kg/min, after two days isolyte-p is used.
- Prophylactic calcium gluconate administration 3-4ml/kg/day for two days given along with iv fluids.
- Monitoring of iv fluids and electrolytes every 12-24hrs/d.
- After 2days Na 3mmol/kg/d and K 2mmol/kg/d should be added.
- Term neonate loses 1-3% of their birth weight daily and in preterm 2-3%
- Failure to lose weight indicates fluid overload and excessive wt loss >3% in a day is non physiological and observe for dehydration and shock features
- Urine output- A well hydrated baby pass urine 1-3ml/kg/hr.

Fluid requirements (ml/kg)

Day of life	Birth Weight	
	>1500 g	1000 – 1500g
1	60	80
2	75	95
3	90	110
4	105	125
5	120	140
6	135	155
7 onwards	150	170

GAVAGE FEEDING [NG & OG]

- Gavage feeding is initiated in baby of GA 28-31w and also in baby who is on iv fluids after 3-5 days onwards.
- Check the position of tube before starting.
- Connect the barrel end of syringe after removal of plunger.
- Fill the barrel with required amount of milk and let the milk run from the syringe through the gastric tube.
- It should take about 10-15 minutes for the to flow into the infants stomach.
- Observe the infant during the entire gastric tube feed
- Stop the tube if the infant shows any of the following signs -breathing difficulty ,change in color, vomiting etc.

TUBE FEEDING GUIDELINES

Birth weight[g]	Initial rate[ml/kg/day]	Volume increase[ml/kg 12hrly]
<1000	10	10
1001-1250	10-20	10
1251-1500	20-30	10-15
1501-1800	30	15
1801-2500	30-40	15-20

OROGASTRIC FEEDING[GAVAGE]

PALADAI FEEDING

- Paladai feeding is initiated in the babies of GA 32-34w and in switching over from gavage feed after 3-5days .Place the infant in an up right position on mother's lap
- Take the required amount of EBM clean syringe and fill the paladai with milk
- Place the paladai at the lips of the baby.
- Feed slowly and look for active swallowing, repeat until required amount has been fed.
- Wash the paladai with soap and water then put in boiling water for 20min to sterilize before next feed.

PALADAI FEEDING

EXPRESSED BREAST MILK

- All preterm infants mothers should be ideally counselled and supported in expressing their own milk.
- Ideally within hours of delivery so that infant should get benefit of colostrum.
- EBM can be stored in stainless steel container about 6hrs in room temperature , 24hrs in refrigerator and upto 3months at minus 20 degree centigrade.
- DONOR HUMAN MILK: in a centres where milk banking facilities are available.
- Only few centres in India have standardized human milk bank like NEW DELHI ,CHENNAI etc
- Its not a practical option in most Indian settings.

PRETERM FORMULA FOR PRETERM

CONSTITUENTS	GRAMS PER 100ML OF FORMULA
PROTEIN	2[WHEY:CASEIN PROTEIN RATIO 60:40]
FAT [butter fat ,PUFA,DHA,MCT]	4
CORBOHYDRATE[Lactose n maltodextrin]	10-12 [6& 6]
OSMOLALITY	Around 300mosm/lit
RENAL SOLUTE LOAD	Up to 100mosm/l
CALORIES	80
VITAMINS AND MINERALS	As per RDA

HUMAN MILK FORTIFIER

Lactodex Hmf Sachet is composed of the following active ingredients (salts)

- Energy - 88 Kcal
- Vegetable Fat - 4.7 gm
- Carbohydrate - 7.3 gm
- Protein - 1.5 mg
- Vitamin D - 502 iu
- Vitamin C - 14.3 mg
- Vitamin A - 1650 iu

LACTODEX-HMF

- Energy -1.1
- Fat -1.2
- Carbohydrate-0.5g
- Protein-1.1
- Vitamin D-150
- Vit C-12
- Vit A-950
- Other vitamins and minerals.

ENFAMIL-HMF

BREAST MILK

- Ideal food for neonates and best gift that mother can give to her baby.
- It contains all the nutrients for normal growth and development of baby from birth to first 6months of life.
- Ensuring exclusive breast feeding up to 6 months is the best intervention to reduce infant and under-5 mortality.
- Ideal time to start breastfeeding in both NVD and LSCS is ‘AS SOON AS POSSIBLE’
- Coverage evaluation survey [2009] reported that only 33.5% infants were started breastfeeding within 1hr of birth.

BENEFITS BREAST FEEDING

- Nutritional superiority
- Immunological superiority
- Other benefits like it contains growth factors, enzymes and hormones.
- Mental growth
- Protection against many illness in baby
- Benefits to mother are reduce PPH, helps in Uterine involution ,natural method of contraception d/t lactational amenorrhea and reduces risk of breast and ovarian cancer.
- Social bonding between mother and baby.

COMPOSITION OF BREAST MILK

- Colostrum- milk secreted during the initial 3-4days of birth.

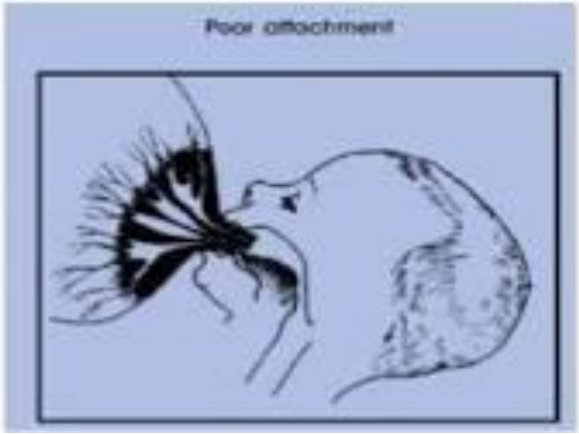
  Small quantity ,thick, yellowish contains large amount of antibodies and vit A,D,E and K.
- Transition milk- secreted after 3-4 days until two weeks. immunoglobulin and protein content decreases and fat and sugar increases.
- Mature milk-follows transition milk, thinner and watery but contains all the nutrients .
- Preterm milk-milk of mother who deliver before 37week.it contains more protein ,sodium, iron, Igs and calories as per the preterm requirement.
- Foremilk-milk secreted at the start of feed. satisfies thirst.
- Hind milk –comes towards end of feed and gives sense of satiety.

GOOD ATTACHMENT

Attachment of baby on mother's breast

- Four signs of good attachment are:

1. Baby's mouth wide open.
2. Lower lip turned outwards.
3. Baby's chin touches mother's breast.
4. Majority of areola inside baby's mouth.



BREASTFEEDING POSITIONS

- Baby's whole body is supported
- Baby's body and head are in one line without twist.
- Abdomen of mother and baby touches each other.
- Baby's nose is at the level of nipple.

Comparison of human milk with cow's & buffalo's milk(values per 100g)

Nutrient	Human milk	Cow's milk	Buffalo's milk
Water(g)	88	87.5	81
Energy (kcal)	65	67	117
Protein(g)	1.1	3.2	4.3
Carbohydrate(g)	7.4	4.4	5
Fat(g)	3.4	4.1	6.5
Calcium(mg)	28	120	210
Phosphorus(mg)	11	90	130
Iron(mg)	-	0.2	0.2
Carotene(mcg)	137	174	160
Thiamine(mcg)	0.02	0.05	0.04
Riboflavin(mcg)	0.02	0.19	0.1
Vitamin C(mg)	3	2	1
Caseinogen/ Lactalbumin ratio	1:2	3:1	-

Source: National Institute of Nutrition ICMR, Hyderabad

ROLE OF MEDIUM CHAIN TRIGLYCERIDES[MCT]

- These are triglycerides whose fatty acids have an aliphatic tail of 6-12corbon atom.
- Natural rich sources for commercial extraction are palm kernel oil and coconut oil.
- These are high fat rich diets so also called as " KETOGENIC DIET"
- Role of MCT in low birth weight infant
- Fat rich enteral nutrition to infuse energy and induce weight gain
- Recommended serving in lbw is 4-10g [2-5] spoons of pure MCT per day in divided doses.
- It can be easily mixed with EXPRESSED BREAST MILK,INFANT FORMULA AND COW'S MILK.

MCT CONTD

functions of Pure MCT

- It spares protein for weight gain.
- Promotes higher weight gain than LCT's due to better absorption.
- Provides energy dense feed.
- Relieves steatorrhoea
- Weight gain of 11.5g/kg/100calories was documented when MCT was given for 15 days.

Weight at birth	average wt gain [15d]
1500 g	500 g
2000 g	900 g

MEDIUM CHAIN TRIGLYCERIDES (MCT) VS. LONG CHAIN TRIGLYCERIDE (LCT)

- MCT-based Ketogenic Diet
- No palatability issues.
- Produces faster ketosis as a result of its rapid intestinal absorption along with prompt delivery to the liver where it is oxidized to form ketone bodies.
- Can readily cross BBB, attributing to the low molecular weight and size.
- Metabolism is carnitine independent, hence can be used in carnitine deficient patients.

- LCT-based Ketogenic Diet
- Highly unpalatable.
- Absorption and metabolism is time consuming, hence ketosis is observed at a slower rate.
- Does not cross BBB.
- Metabolism is carnitine dependent, hence LCT based KD is contraindicated in carnitine deficient patients.

CLINICAL USES OF MCT'S IN PEDIA.

- Effective medical treatment in uncontrolled seizures
- Ketogenic diet theraphy in cancer theraphy.
- Ketogenic diet in AUTISM.
- It can be used in devolopmental delay child.

UNCONTROLLED SEIZURES

- **MCT based Ketogenic diet results in the reduction of seizure frequency as well as in the reduction of seizure severity.**
- **Most of these patients will continue to benefit from the MCT KD for a longer time.**
- **Long-term use of the diet was well tolerated.**
- **No patients developed ECG abnormalities or kidney stones. Increase in lipid profile was rare.**

- **50 children aged 5- 15 years with drug resistant epilepsy were treated with the Medium Chain Triglyceride (MCT) diet.**

- **70% of epileptic children benefited from MCT and**

USES IN DEVELOPMENTAL DELAY AND AUTISM.

- 40 children with global developmental delay (GDD) administered Ketogenic Diet.
- After 3, 6, and 9 months of treatment, the Ketogenic Diet treatment group had significantly greater improvements in the scores of the adaptive, fine motor, and language quotients of the Gesell Developmental Scale
- KD is also neuroprotective and enhances energy production in the brain.

- KD increases the total quantity of bioenergetic substrates (adenosine triphosphate (ATP)) and elevated the energy charge in the brain.
- Ketogenic diet improves Childhood Autism Rating Scale (CARS), Autism Treatment Evaluation Test (ATEC) scales.
- Ketogenic diet also improves better results in cognition and sociability.

SUPPLEMENTATION OF NUTRITION

- In Preterm and birth weight of 1500-2499 have supplement with Iron ,Vit-D and zinc .
- Iron- start 2mg/kg/d at 4weeks f life and continued for 1yr of life.
- Vit-D- 400iu/day start at 2week of life and continue for 1yr.
- Folic acid- folium drops 0.3ml/day.
- Zinc and B 6-etc –Dexvita drops ,1ml/day.

FOR LBW

	RDA[U/kg/d]	EBM only	EBM fortified with lactodex 4g/100ml	EBM fortified with preterm f 4g/100ml
Energy [kcal]	110-135	117	144	153
Protein [g]	3.5-4	2.5	3.2	3.5
Carbohydrates [g]	11.6-13.2	11.6	16.8	15.4
Fat [g]	4.8-6.6	6.8	7.1	8.6
Calcium [mg]	120-140	43	223	104
Phosphate	0-90	22	112	56
Vit –A [iu]	1330-3330	680	1228	788
Vit –D [iu]	800-1000	3.5	140	36
Vit –E [mg]	2.2-11	1.8	6.3	2.8
Vit –B6 [mcg]	45-300	25.7	116	43
Folic acid [mcg]	35-100	6	150	20

KMC BENEFITS IN LBW

PHYSIOLOGICAL BENEFITS

- Keeps neonates warm and cozy
- Protected against cold stress and hypothermia
- Physiological parameters such as heart , respiratory rate, oxygenation and sleep pattern get stabilized.

CLINICAL BENEFITS

- Increases milk production in mother.
- Improves weight gain in infants and thermal protection.
- It reduces respiratory tract and nosocomial infection.
- Improves emotional bonding between infant and mother.


Kangaroo Mother care
www.mayaclinic.in

GROWTH MONITORING OF LBW INFANTS

- Regular growth monitoring helps in in assessing nutritional status and feeding adequacy.
- All LBW infants should be weighed daily and other parameters length and head circumference weekly.
- Both term and preterm lbw infants tend to lose weight [10% and 15% respectively] in the first 7days of life and regain by 10-14days.
- 20-30g/d weight gain is considered appropriate.
- LBW infants should be discharged after they reach 34weeks gestation and are above 1400-1600g and they show consistent weight gain for at least 3consecutive days.

INDICATORS OF FEEDING INTOLERANCE

SYMPTOMS

- Vomiting [altered milk/bile, blood stained]
- Systemic features lethargy , apnea

SIGNS

- Abdominal distension
- Increased gastric residuals.
- Abdominal tenderness
- Reduced or absent bowel sounds
- Other systemic signs like bradycardia,cyanosis etc

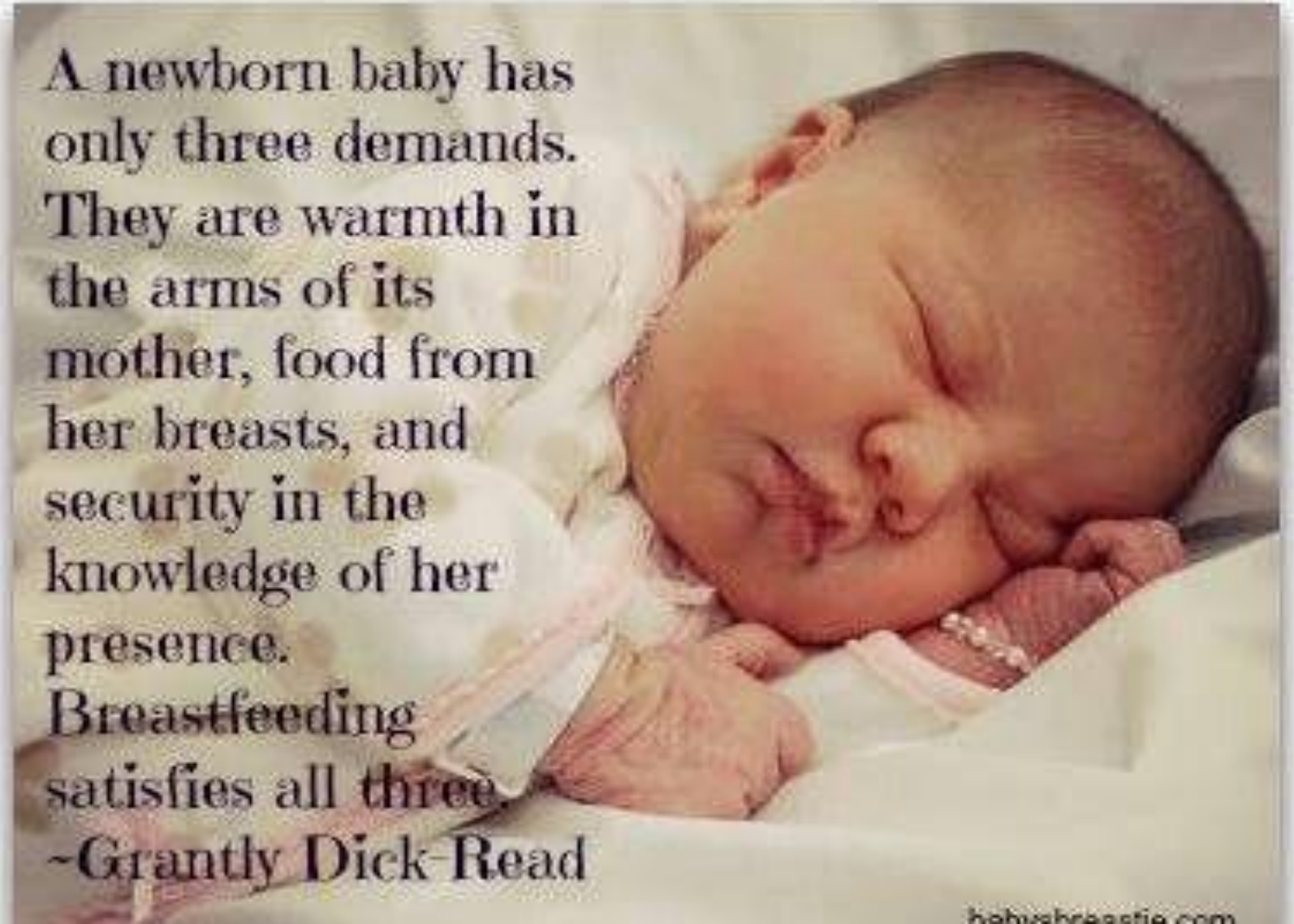
CAUSES OF INADEQUATE WEIGHT GAIN.

- Inadequate intake: inadequate feeding method,less frequent feeding, prematurely removing the baby from feed.
- Infant on spoon or paladai feed: excess spilling, incorrect measment,not fortifying the milk in VLBW.
- Increased demands: illness such as hypothermia, or cold stress
- Underlying diseases: like anemia, metabolic acidosis,late onset sepsis,feedintolerance.

TAKE HOME MESSAGE

- Optimal feeding of LBW infants is important for the immediate survival and subsequent growth.
- Close monitoring of growth and nutrition
- • Early initiation of enteral nutrition . breast milk should be the preferred nutrient.
- Its equally important to have a protocol based approach to manage feeding in LBW’s
- • KMC have significant role in early discharge, should be encouraged.

THANK YOU


A newborn baby has only three demands. They are warmth in the arms of its mother, food from her breasts, and security in the knowledge of her presence. Breastfeeding satisfies all three.
~Grantly Dick-Read


THANK YOU
WELLS FARGO
JDRF 2005
We're on Track For a Cure