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Breast feeding

Human milk is the most appropriate of all available milk for the human infant because it is uniquely adapted to his or her needs. Breast feeding has short and long term medical and neurodevelopment advantages. The decision to breastfeed should be considered as public health issue and not only a lifestyle choice. Early feeding and nutrition are of importance in the origin of multiple adult diseases such as (T2DM, hypertension, obesity, and the metabolic syndrome).

- **When to start?**

Breast feeding should begin as soon after delivery as the condition of the mother and the baby permits preferably within first hours. Subsequently, frequent suckling is beneficial as it enhances the secretion of the hormones initiating and promoting lactation. The first 2 days of breast feeding, and perhaps the first hour of life, may determine the success of breast feeding

- **When to stop?**

The AAP supports continued breastfeeding, along with appropriate complementary foods introduced at about 6 months, for as long as mutually desired by mother and child for 2 years or beyond. This recommendation is consistent with guidelines and policies of the WHO, AAFP, and Canadian Pediatric Society

Breast Milk Composition

Breast milk is made up of hundreds of substances, including protein, fat, carbohydrates, vitamins, minerals, water, enzymes, and hormones. This composition isn't constant, however; it varies from parent to parent. It can even change within the same parent, depending on the baby's needs.

Breast milk changes during each feeding, from one feeding to another throughout the day, and over time to meet the needs of a growing child. Here are some of the factors that cause changes in the composition of breast milk:

- Infant factors: Growth spurt cause babies to nurse more often and for longer periods, which helps increase both the volume and fat content of breast milk. (e.g., Breast milk in mothers of premature babies had more protein and 30% more fat than mothers of full-term babies)
- Maternal diet: micronutrients and fat content of breast milk is most modifiable by mother's diet
- Fore milk-hind milk variations : The Fat content in milk increases throughout each feeding, with the hindmilk providing up to two or three times more fat than the foremilk. Foremilk is thin, watery, and lower in fat, calories, and vitamins A and E than hind-milk.
- Day vs. night: Breast milk is like a biological clock, literally changing by the hour. For instance, breast milk contains low levels of an amino acid called tryptophan (the precursor to the "sleep" hormone melatonin) in the morning and much higher levels at night. breastfeeding help infants to establish their circadian rhythm of being awake during the day and asleep at night.
- Stage of lactation: colostrum contains high protein and antibodies, transitional milk more volume and less antibodies, mature milk more volume and carbohydrate and less proteins.

Lipids: make up 3-5% of the composition of human milk but give about 50% of calories.

- The main lipids are triglycerides (about 98% of breast milk fat) important energy source
- Cholesterol: a steroid important for brain and nerve development, hormones synthesis
- Docosahexaenoic Acid (DHA): essential fatty acid, important for CNS, vision especially in premature babies

Carbohydrates: mature human milk contain 7% CHO, majority is LACTOSE. Others: fructose, oligosaccharides. Breast milk Lactose important for
1. Energy and development
2.Absorption of essential minerals including calcium
3.Important for brain development

Protein: The proteins of human milk are divided into (Whey, Casein) fractions or complexes The most abundant proteins are: [casein, α-lactalbumin, lactoferrin, secretory immunoglobulin IgA, Lysozyme, and serum albumin].The protein content of milk obtained from mothers who deliver preterm is significantly higher than that of mothers who deliver at term .Human Breast milk protein is not affected by maternal diet.

Breast Milk Stages (stages of lactation)

1. Colostrum: it is the It is the first milk produced immediately after delivery at 3rd to 10th days of the infant's life then transforms into transitional milk and finally to mature milk, which is distinct in volume, appearance and composition. Colostrum, produced in low quantities in the first few days postpartum, is rich in immunologic components such as secretory IgA, lactoferrin, leukocytes, as well as developmental factors such as epidermal growth factor. Colostrum also contains relatively low concentrations of lactose, indicating its primary functions to be immunologic and trophic rather than nutritional. Levels of sodium, chloride and magnesium are higher, and levels of potassium and calcium are lower in colostrum than later milk. The timing of secretory activation (lactogenesis stage II) varies among women, but typically occurs over the first few days postpartum. Delayed onset of lactogenesis is defined as onset >72 hours after delivery and appears to occur more often with preterm delivery and maternal obesity and may be predicted by markers of metabolic health. The amount of colostrum is 15-50 ml/day. It is bright lemon in color, more alkaline than milk, and has more specific gravity, anti-infective and laxative effects so it is beneficial to get rid of meconium. Colostrum differs from mature milk in that it contains more protein and immunoglobulins, volumes are low, but water or formula supplement are not required
Contents of colostrum: *Protein: 2.7gm/100ml (1.2 casein+1.5 globulin).
*Fat: 2.9. *Lactose: 5.3 *Minerals: 0.5
2. Transitional milk shares some of the characteristics of colostrum but represents a period of "ramped up" milk production to support the nutritional and developmental needs of the rapidly growing infant, and typically occurs from 5 days to two weeks postpartum, after which milk is considered largely mature.

3. Mature milk: By four to six weeks postpartum, human milk is considered fully mature. In contrast to the dramatic shift in composition observed in the first month of life, human milk remains relatively similar in composition, although subtle changes in milk composition do occur over the course of lactation.

Advantages of breast feeding

1. Always readily available at the proper temperature and need no time for preparation.
2. Fresh and free of contaminating bacteria which reduces the chance of gastrointestinal disturbance.
3. Allergy and intolerance to cow milk create significant disturbance and feeding difficulties that are not seen in breast feed infants.
4. Psychological advantage of breast feeding for both mother and infant.
5. Decreased incidence of [lower respiratory tract infections, severe diarrhea, otitis media, and obesity] in the first year of life in infant who breast fed exclusively for at least 6m.
6. Human milk contains bacterial and viral antibodies.
7. Feeding *preterm* infants human milk has beneficial effects on their long-term neurodevelopment (IQ) and a lower readmission rate in the first year of life

Anti-infective properties

Humoral

- Secretory IgA: Comprises 90% of immunoglobulin in human milk. Provides mucosal protection.
- Bifidus factor: Promotes growth of Lactobacillus bifidus, which metabolizes lactose to lactic and acetic acids. The resulting low pH may inhibit growth of gastrointestinal pathogens
- Lysozyme: Bacteriolytic enzyme
- Lactoferrin: Iron-binding protein. Inhibits growth of Escherichia coli
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- Interferon: anti-viral activity

Cellular:

- Macrophages: Phagocytic. Synthesize lysozyme, lactoferrin, C3, C4
- Lymphocytes: T cells: may transfer delayed hypersensitivity responses to infant.
  B cells: synthesize IgA

Nutritional properties

Protein quality: More easily digested curd (60: 40 whey: casein ratio)
Lipid quality: Rich in oleic acid. Improved digestibility and fat absorption, Enhanced lipolysis lipase.
Long-chain polyunsaturated fatty acids: Structural lipids; important in retinal development
Calcium: phosphorus ratio of 2:1: Prevents hypo calcemic tetany and improves calcium absorption
Renal solute load: low
Iron content: Bioavailable (40–50% absorption)

Factor influence milk production and secretion:

1.Endocrine factor: prolactin, oxytocin, thyroxin.
2.Anatomical factor: nipple retraction, herpes zoster infection.
3.Mechanical factor: should be fully evacuated to enhance the process of milk production and secretion.
4.Psychological factor: stress, fear, happiness, relaxation.
5.Maternal factor: Nutrition, Fatigue, hygiene.
6.Drugs: chlorpromazine, anti-epileptic.

Technique:

*Both hands and nipple should be clean.
*The infant should be hungry, dry, neither cold or too warm and held in a comfortable semi sitting position for his or her enjoyment and for ease of eructation without vomiting.
*Mother must be comfortable and completely at ease.
*The infant will empty breast in 5-20 minute as range.
*The infant should be permitted to suck until satisfied unless the mother has sore nipples.
*After feed, the infant should be erect over the mother shoulder.
*Then should be placed in the crib on the back or on the right side to facilities emptying of the stomach.
*Both breasts should be used at each feeding.

Complications of breast feeding

Unknown intake	Volume of milk intake not known
Transmission of infection	Maternal CMV, hepatitis B and HIV – increases risk of transmission to the baby
Breast-milk jaundice	Mild, self-limiting, unconjugated hyperbilirubinaemia; continue breast-feeding
Transmission of drugs	Antimetabolites and some other drugs contra-indicated. Check formulary
Nutrient inadequacies	Breast-feeding beyond 6 months without timely introduction of appropriate solids may lead to poor weight gain and rickets
Vitamin K deficiency	Insufficient vitamin K in breast milk to prevent haemorrhagic disease of the newborn. Supplementation is required
Potential transmission of environmental contaminants	Nicotine, alcohol, caffeine, etc.
Less flexible	Other family members cannot help or take part. More difficult in public places
Emotional upset	If difficulties or lack of success can be upsetting

Difficulties of breast feeding

For the mother:

Nipple pain:

One of the most common complains of breastfeeding mother occur in the immediate postpartum period. **Poor infant position and improper latch** are the most common causes of nipple pain beyond the mild discomfort felt early in breast feeding.

If the condition persists and infant refuse to feed evaluation for **nipple candidiasis** is warranted and if candidiasis is presented anti-fungal cream that wiped off the breast just before feeding and infant treated with oral anti-fungal medication (oral nystatin drops +/- gention violet)

Acute breast engorgement:

Engorgement, one of the most common causes of lactation failure, should receive prompt attention because milk supply can decrease quickly if the breasts are not adequately emptied

- In the 2nd stage of lactogenesis physiological fullness of breast occurs. Breast may become engorged: firm, overfilled and painful as the pattern of breast milk production adjust to the infants feeding schedule
- incomplete removal of milk as a result of **poor breast-feeding technique or infant illness** can cause engorgement. breastfeeding immediately at sign of infant hunger will eventually prevent this from occurring.

To reduce engorgement breast should be soften before infant feeding with combination of hot compresses and expression of milk, to reduce inflammation and pain, between feedings a supportive bra should be worn, cold compresses applied and oral NSAIDs administrated.

Mastitis:

- Occurs in 2-3% of lactating mothers, usually unilateral.
- Manifesting with (warmth, tenderness, edema, erythema) after 2nd post-delivery week
- Sudden onset of breast pain , myalgia, fever , nausea , vomiting headache ,
- Organisms (s.aureus, Ecoli,..)
- Dx confirm by physical examination

R/ oral antibiotics, analgesics, promote breast feeding or emptying the breast

Breast feeding usually should not be stopped because the mother's mastitis commonly has no adverse effects on the breast fed infant.

For the infant:

* Nasal obstruction (catarrhal), due to URTI, treated by normal saline drops.
* Thrush stomatitis: treated by gention violet or nystatin.
* Tie tongue.
* Cleft lips and cleft palate.
* Poor sucker: extreme premature.
* Hypotonia, CNS disorders.
* Other structural congenital anomalies.

Adequacy of milk intake

Adequacy of milk intake can be assessed by [weight gain, voiding ,and stooling patterns of the infant].A well-hydrated infant voids 6-8 times a day. Each voiding should soak, not merely moisten, a diaper, and urine should be colorless.By 5-7 days, loose yellow stools should be passed approximately about 4 times a day.

Rate of weight gain provides the most objective indicator of adequate milk intake. Total weight loss after birth should not exceed 7%, and birth weight should be regained by 10 days. The mean feeding frequency during the early weeks postpartum is 8-12 times per day. An infant may be adequately hydrated while not receiving enough milk to achieve adequate energy and nutrient intake.

Inadequate milk intake

Insufficient milk intake, dehydration and jaundice in infant can occur within the first week of life

Signs:
-lethargy
-Delayed stooling
-Decreased urine output
-Wt. loss>7-10% of birth wt.
-Hypernatremic dehydration
-Inconsolable crying
-Increased hunger

Causes
Insufficient milk production
Failure of established breastfeeding
Health conditions in the infant that prevents proper breast stimulation

Parents should be counseled that breastfed neonates feed 8-12 times per day with minimum 8 times per day
dx:

1- Careful prenatal history can identity maternal factors associated with this problem (failure of the breast to enlarge during pregnancy or within 1st few days following delivery)
2- direct observations of breastfeeding can identify improper techniques.
3- if a large volume of milk expressed manually after breastfeeding, the infant might not be extracting enough milk, eventually leading to decreased milk output
4- late preterm infants (34-36 wks) are at risk for insufficient milk syndrome because of poor suck and swallow patterns or medical issues.

Criteria for under feeding:

1.Baby cry all the time.
2.Long meal time.
3.Sleeplessness or very short sleeping time.
4.Colic due to air swallowing, restless and screaming.
5.Constipation/unusual hunger diarrhea,
6.Oliguria.
7.Loss of weight.
8.Test of weight and feeding is below normal.

Criteria for over feeding:

1.Regurgitation.
2.Vomiting.
3.large bulky stool.
4.Abdominal distension.
5.Colic.
6.Polyuria.
7.Sweating.
8.Overweight.

Contraindications

1. Markedly inverted nipples.
2. Acute infection in the mother.
3. Drug: cytotoxic drugs and anticoagulants like warfarin.

*Antithyroid, lithium, anticancer, isoniazid, are contraindicated.

*Temporary cessation of nursing if diagnostic radio pharmaceuticals, chloramphenicol, metronidazole, sulfonamide, laxative.

4. septicemia, nephritis, eclampsia, profuse hemorrhage, active T.B, typhoid fever, breast cancer, malaria.
5. Poor nutrition, substance abuse, severs neurosis, postpartum psychosis.
6. Breast milk allergy, very rare.
7. Inborn error of metabolism.

Absolute and Relative Contraindications to Breastfeeding Because of Maternal Health Conditions

MATERNAL HEALTH CONDITION	DEGREE OF RISK
HIV and HTLV infection	In the United States, breastfeeding is contraindicated. In other settings, health risks of not breastfeeding must be weighed against the risk of transmitting virus to the infant.
Tuberculosis infection	Breastfeeding is contraindicated until completion of approximately 2 wk of appropriate maternal therapy.
Varicella-zoster infection	Infant should not have direct contact to active lesions. Infant should receive immune globulin.
Herpes simplex infection	Breastfeeding is contraindicated with active herpetic lesions of the breast.
CMV infection	May be found in milk of mothers who are CMV seropositive. Transmission through human milk causing symptomatic illness in term infants is uncommon.
Hepatitis B infection	Infants routinely receive hepatitis B immune globulin and hepatitis B vaccine if mother is HBsAg positive. No delay in initiation of breastfeeding is required.
Hepatitis C infection	Breastfeeding is not contraindicated.
Alcohol intake	Limit maternal alcohol intake to <0.5 g/kg/day (for a woman of average weight, this is the equivalent of 2 cans of beer, 2 glasses of wine, or 2 oz of liquor).
Cigarette smoking	Discourage cigarette smoking, but smoking is not a contraindication to breastfeeding.
Chemotherapy, radiopharmaceuticals	Breastfeeding is generally contraindicated.

Breast milk collection

- The pumping of breast milk is common practice when the mother and the baby are separated
- Good hand washing and hygiene should be emphasized.
- electric breast pumps are generally more efficient and better tolerated by mothers than mechanical pumps or manual expression.
- Collection kits should be cleaned with hot soapy water, rinsed and air dried after each use. glass or plastic containers should be used to collect the milk
- Refrigerated breast milk can be used within 48hrs.
- Frozen breast milk can be used for up to 6 mo.

Milk should be thawed rapidly by holding the containers under running tepid water and used completely within 24 hrs. after thawing, it should never be microwaved.