

BREAST FEEDING

By

HASNAA MOAWED M. EL-REFAEI

M.B.B ch.

M.Sc of Pediatrics

Reveiwed By

Dr. Mohamed Reda Bassiouny

Professor of Pediatrics

Faculty of Medicine - Mansoura University

Dr. EL-HASSAN M. EL-MOGY

MD Pediatrics - Consultant of Pediatrics

Mansoura International Specialized Hospital

2003

CONTENTS

‏ General Aspects of Breast –feeding and Lactation.....	2
- Anatomy of the Breast	
- Psychophysiology of Lactation	
- Breast milk volume and Composition	
‏ Maternal Diet During Breast feeding	7
‏ Management of Breast feeding.....	9
‏ Assessment of slow growth in the breast-fed infant.....	11
‏ The use of Human Milk for Premature infants.....	12
‏ Advantages of Breast feeding	13
‏ Breast – feeding Categories and Patterns.....	21
‏ Problems in Breast feeding :	23
I Contraindications to breast feeding	23
II Difficulties in breast feeding	25
III Medicines and nursing mothers	26
‏ Weaning	29
‏ Prevention of Breast feeding Tragedies	34
‏ Strategies to promote Breast feeding success	38
‏ References	40
‏ Arabic Summary	

LIST OF ABBREVIATIONS

AA	Arachidonic acid
ARI	Acute Respiratory Infection
BF	Breast Feeding
DHA	Docosahexaenoic Acid
DRI	Dietary Reference Intakes
LCPs	Long Chain Poly Unsaturated Fatty acids
RDAs	Recommended Dietary Allowances
SIDs	Sudden Infant Death Syndrome

General Aspects of Breast-Feeding and Lactation

Anatomy of the Breast:

The mammary glands are modified exocrine glands, which undergo numerous anatomical and physiological changes in pregnancy and immediately following birth. The breast is composed of glandular tissue surrounded by adipose tissue. It is separated from the underlying chest muscles and ribs by connective tissue. The basic units of mature glandular tissue are the alveoli, which are composed of secretory acinus units in which the ductules terminate. Each cluster of secretory cells of an alveolus is surrounded by a contractile unit of myoepithelial cells responsible for ejecting milk into the ductules. Each ductule then merges, without communicating with its neighbor, into a larger collecting lactiferous or mammary duct. Mammary ducts then widen into the lactiferous sinuses (ampulla) located behind the nipple and the areola, the surrounding pigmented area of the breast. There are 15 to 20 subdivided lobes in each breast. The covering skin is modified at the center of each breast to form a mammary papilla or nipple into which the lactiferous sinuses open. Surrounding the nipple is the areola within which lie the tubercles of Montgomery, small sebaceous glands which enlarge in pregnancy and provide nipple lubrication and antisepsis ¹.

The blood supply of the breast mainly through the internal mammary (60%) and lateral thoracic arteries (30%) while the nerve supply of the breast is derived from the intercostal nerves of fourth, fifth and six intercostal spaces ².

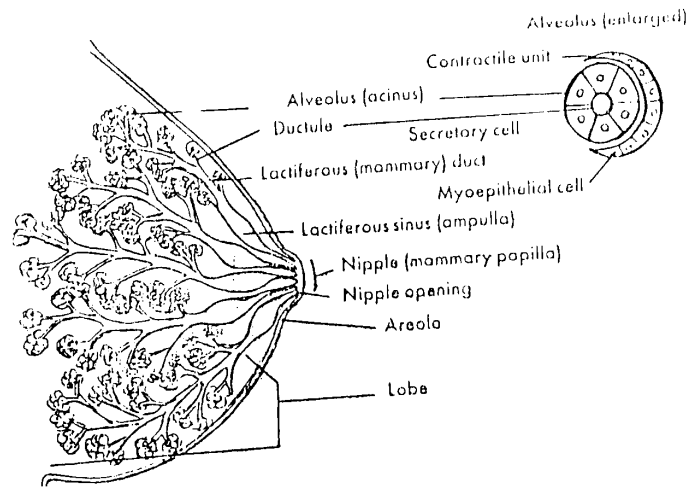


Fig.1 Schematic diagram of breast ¹

During pregnancy the breast grows larger, the skin appears thinner, and the veins become more prominent. As the nipples become more erect, pigmentation of the areola increases and the glands of Montgomery enlarge. The ductal system proliferates and differentiates under the influence of estrogen while progesterone promotes an increase in size of the lobes, lobules and alveoli ¹.

Psychophysiology of lactation :

Hormonal control of lactation :

The principle hormone in milk biosynthesis is prolactin ³. Studies on prolactin show a clear correlation between nipple stimulation during feedings and increased prolactin levels. Previously, it was thought the prolactin level remained low during human pregnancy as it does in animals. Now we know that prolactin levels steadily rise during pregnancy, falling during the 2 to 3 hours prior to birth and peaking around 3 hours after delivery. As placenta and ovarian estrogens decrease following birth, the anterior pituitary gland releases prolactin. Through the mediation of the hypothalamus the alveolar cells respond with the production of milk. The highly vascularized secretory cells extract water, lactose, amino acids, fat, vitamins, minerals, and numerous other substances from the mother blood, converting them to milk for her infant. Responding to suckling, the

posterior pituitary hormone, oxytocin, causes contraction of the myoepithelial cells surrounding the alveoli. The secreted milk is then ejected into the ductules and moved along to the lactiferous sinuses where it becomes readily available to the newborn through the nipple opening ¹.

When the nipple is stimulated, the hypothalamus inhibits the release of dopamine, this lower level of dopamine stimulates the release of prolactin and causes milk production ⁴.

The milk secretion is initiated and maintained by two important mechanisms, “ the milk secretion reflex ” which is mediated by prolactin secreted from the anterior pituitary due to infant suckling of the breast and “ the let down reflex” which also occurs in response to stimulation of the nipple but mediated by oxytocin from the posterior pituitary which stimulates myoepithelial cells surrounding alveoli ejecting milk into terminal lacteoles, these reflexes are inhibited or facilitated by psychogenic factors and their inhibition is the commonest cause of breast-feeding failure ⁵.

Initiation of lactation :

Initiation of lactation is the result of complex interplay between maternal and infant behavior. Reflexes have an important part in this. In baby rooting, suckling and swallowing reflexes have important role. In the mother, prolactin, nipple erection and milk let-down reflexes govern the lactational process ⁶.

If the birth process has been relatively uncomplicated, the mother should be encouraged to breast – feed immediately after birth and regularly there after ⁷.

Early initiation of breast-feeding is beneficial for a number of reasons. For the mother, early suckling promotes the release of a hormone that helps the uterus to achieve a contracted state and reduces the risk of post partum hemorrhage for the child, it is important to receive the

colostrum which is contained in the first breast milk after delivery as it is rich in anti-bodies that are needed since the child's own immune system is immature ⁸.

Breast – Milk Volume and Composition :

Research suggests that lactation is robust and breast-milk is relatively adequate in its volume and essential nutrients irrespective of maternal nutritional status .

Volume :In general , healthy infants consume 450 – 1200 ml milk/day for the first 4-5 months . Increasing the intake of fluid doesn't seem to affect milk volume . Therefore , lactating women should maintain adequate fluid intake but should not attempt to boost milk volume by consuming excess fluids .

Composition :Mature breast-milk usually has constant levels of about 7g/dl carbohydrate and about 0.9 g/dl proteins (Table 1). But the composition of fat essential for neonatal growth, brain development, and retinal function is highly variable and is affected within hours and to a large extent by maternal nutritional intake, the length of gestation, and the period of lactation. Vitamins and minerals also vary according to maternal intake . But even when these nutrients are lower in breast-milk than in bovin milk or formulas , their higher bioactivity and bioavailability more nearly meet the complete needs of neonates than do even the best infant formulas for example because of high bioavailability of iron in human milk, exclusively breast-fed infants do not need iron supplements during the first 6 months of life ⁹.

Table 1 : Composition of Mature Human Milk and Cow Milk:

Nutrient	Human Milk (100ml)	Cow Milk (100ml)
Macronutrients		
Energy (Kcal)	62-70	61
Protein (g)	0.9	3.3
Carbohydrate (h)	7.3	4.7
Fat (g)	3-5	3.3
Vitamins		
Vitamin A (IU)	133-177	126
B-Carotene (µg)	16-21	N/A
Vitamin D (IU)	2.5-5.0	41
Vitamin E (IU)	0.48	0.06
Vitamin K (µg)	0.1-0.23	6.0
Vitamin C (mg)	5.0-6.0	0.94
Thiamine (µg)	18.3-20	38
Riboflavin (µg)	31.0-50	162
Vitamin B ₆ (µg)	10.7-20	42
Vitamin B ₁₂ (µg)	0.02-0.06	0.36
Nicotinic acid (µg)	0.18	0.08
Folic acid (µg)	4.2-5.0	5.0
Pantothenic acid (µg)	261	314
Biotin (µg)	0.53	N/A
Minerals		
Calcium (mg)	29.4	119
Phosphorus(mg)	13.9	93
Magnesium(mg)	3.0	13
Iron(mg)	0.02-0.04	0.05
Zinc(mg)	0.15-0.25	0.38
Manganese(µg)	0.41	2-4
Copper(µg)	31	30
Chromium(µg)	0.03	0.8-1.3
Selenium(µg)	1.6	0.5-5.0
Fluoride(µg)	0.5-1.0	N/A
Sodium(mg)	11.2-14	49
Potassium(mg)	44.3	152
Chloride(mg)	37.3	N/A
Other composition data		
Protein source	80%whey; 20%casein	18% whey; 82%casein
% Calories protein	6	21
Carbohydrate source	Lactose	Lactose
%Calories carbohydrate	39	31
Fat source	Human	Butterfat
%Calories fat	55	48
Osmolality (mOsm/kg H ₂ O)	300	288
Vitamin D added		
NA, not available		
Source: Data from references 81, 82, 83.		

Maternal Diet During Breast feeding :

Throughout pregnancy, the maternal body is preparing for lactation by increasing the development of the breast tissue and storing additional nutrients and energy. The DR I Committee are to be issued in seven separate nutrient groups. The first group of nutrients consists of calcium , phosphorus, magnesium, vitamin D, and fluoride ¹⁰ .

Overall, recommendations for maternal diet during lactation include a well-balanced diet comparable to that of nonlactating woman, with an additional need for about 500 calories and vitamin/mineral supplementation for those not consuming a variety of foods. Lactation will not produce a net drain on the mother if the amount of energy available and the requirement of any given nutrient are replaced in the diet ¹¹ .

Energy requirements are greater if weight gain during the pregnancy was low, weight during lactation falls below standards for height and age , and/or more than one infant is being nursed . There is some evidence that successful lactation can be maintained at energy intakes somewhat lower than the RDAs without adversely affecting lactation performance or infant growth ¹² .

Increases in protein, vitamin, and mineral requirements can be met by consuming the appropriate number of servings from the Food Guide Pyramid (Table 2) and choosing nutritious foods for the additional calories needed to support lactation. For those mothers not motivated to eat a well-balanced diet or for those avoiding primary food groups, continuation of prenatal vitamin and/or Calcium supplementation, is recommended. It is suggested that iron supplementation be continued post partum, whether breast feeding or not, to replenish iron stores depleted by pregnancy ¹² .

Most breastfeeding women experience increased thirst. This should naturally result in additional intake of fluids. There are no data to support

the idea that forcing fluids will increase or restricting fluids will decrease milk production ¹¹.

Although the quality of human milk is remarkably preserved, even when the mother is poorly nourished, maternal diet can affect composition in the following ways:

- * Decreased milk volume from a diet low in energy, carbohydrates and/or proteins ¹³.
- * Altered fatty acid composition that mirrors maternal intake ¹¹.
- * Varied content of some vitamins and minerals ¹¹.
- * Passage of medications, drugs and environmental contaminants ¹⁴.

Table-2 Maternal Diet During Breast feeding:

Food Group	Number of Servings
Milk (and milk substitutes)	4 cups (6cups teens) or equivalent
Meat (and meat substitutes)	Two 2-to 3-oz servings or equivalent
	Fruits
	2-3 ½-cup servings (Vitamin C source daily)
Vegetables	2-3 ½-cup servings (Vitamin A source
	3-4 times/week)
Breads and cereals	6-11 serving (serving equal to one
	Slice of bread or ½-¾ cup of cereal)
Fats	In moderation

Source: based on data from¹³.

Management of breast feeding :

Successful Lactation is greatly influenced by the motivation and confidence of the mother and by support from those around her, including the father, other family members, and medical professionals.

Infant suckling stimulates release of the hormone prolactin from the pituitary which is responsible for milk release. To establish and sustain lactation, it is necessary to allow the baby access to the breast on demand. The more the mother nurses, the more milk she will produce ¹⁵.

The following list offers some tips for ensuring breast feeding success :

- 1-Initial breast feeding. Ideally, this should take place as soon after delivery as possible .
- 2-**Positioning:** Have the mother find a comfortable position, either lying down or sitting up. Change the position of the baby with every feeding during the first few weeks. So that pressure and friction on the mother's nipples are rotated. The mother should use one hand to support and guide her breast and put the other around the baby and on the baby's bottom to support and move the baby .
- 3 - **Latching on:** The mother can stimulate the rooting reflex by touching the baby's closest cheek . when the mouth is open wide , pull the baby close . Be sure the baby's mouth latches on to suckle the mother's entire nipple, with the lips well behind the nipple .
- 4 – **Timing:** In the first few weeks, nurse the baby 8 – 12 times a day, or about every 2–3 hours. The feedings will become less frequent after breast feeding is established. Build up to at least 10–15 minutes per breast per feeding and after both breasts at each

feeding rotating sides where feeding is initiated.

5 – **Assessing adequacy** or (How do I know if my baby is getting enough ?).

The following are signs that a baby is receiving adequate fluid and calories, the baby will:

- a) have at least 6 – 8 thoroughly wet diapers a day.
- b) have regular bowel movements .
- c) nurse 8 – 12 times a day .
- d) seen satisfied after nursing .
- e) grow at a relatively predictable rate ¹⁶.

A number of situations arise during the early weeks of breast feeding that, if unanticipated and poorly managed, can jeopardize a successful nursing experience ¹⁷. Many new mothers return to work or school after their babies are born. They can continue to breastfeed by these methods:

- * arranging to go to the baby or having the baby brought to them.
- * pumping and saving the milk .
- * discontinuing the feeding (s) when they are away but continuing to nurse at other times ¹⁰.

HOW TO ASSESS SLOW GROWTH IN THE BREAST FED INFANT :

Pediatricians must monitor early breast feeding to detect and manage breast difficulties that lead to slow weight gain and subsequent low milk production “ infant growth during the first 3 months of life provides a clear indication of breastfeeding progress”¹⁸.

Healthy, breastfed infants lose less than 10% of birth weight and return to birth weight by age 2 weeks to 3 months. Any deviation from this pattern is cause for concern and for a thorough evaluation of the breastfeeding process. Evaluation includes history taking and physical examination for the mother and infant¹⁹.

Observation of a breastfeeding session by a skilled clinician is crucial. A differential diagnosis is generated, followed by a problem – oriented management plan–special techniques may be used to assist in complicated situations ongoing monitoring is required until weight gain has normalized²⁰.

In most cases, early intervention can restore promptly infant growth and maternal milk supply. Underlying illness of the infant or mother must be considered if weight gain and milk supply do not respond to the earlier mentioned interventions are expected. Physicians are responsible for knowledge about additional resources and for coordination of breastfeeding care. Pediatricians have a pivotal role in achieving the goals of optimal breastfeeding and appropriate infant growth²¹.

THE USE OF HUMAN MILK FOR PREMATURE INFANTS:

Various methods have been reported and used clinically to augment the nutrient supply for human milk-fed premature infants . These methods include specialized multinutrient powdered mixtures (fortifiers) Complete liquid formulas designed to be mixed with human milk , complete powdered formulas to be mixed with human milk , and alternate feeding of human milk and preterm formula ²².

Although the optimum nutrition of premature infants is unknown , data are accumulating to suggest that human milk , fortified with additional nutrients, is appropriate for tube-fed infants. The use of fortified human milk typically provides premature infants adequate growth, nutritional status when fed at approximately 180 ml / kg/d compared with unfortified human milk ²³ .

Data are needed to determine the precise quantity of nutrients to be added as supplements. Although large quantities of calcium seem to be needed, the exogenous calcium may affect fat absorption adversely– Manipulation of milk may affect the intrinsic host–defense properties of the milk. Compared with preterm formula, the feeding of fortified human milk may provide significant protection from infection and NEC ²⁴ .

The potential stimulation of an enteromammary pathway through skin to skin contact provides species–specific antimicrobial protection for premature infants. Thus, for premature infants neonatal centers should encourage the feeding of fortified human milk, together with skin to skin contact, as reasonable methods to enhance milk production while potentially facilitating the development of an enteromammary response ²⁵ .

ADVANTAGE OF BREAST-FEEDING :

(1) Anti – Infective and Immunologic Advantages :

It was reported human milk is fresh and free of contaminating bacteria, which reduces the chances of gastrointestinal disturbance ²⁶.

Research evidence indicates that breast-feeding decreases infant infections by decreasing exposures to pathogens that may contaminate formula. Further infants who were formula-fed lack the natural immunities to fight disease, which were provided to infants who were fed breast-milk ²⁷.

Also it was reported that the protection provided by breast-feeding against infectious agents is best demonstrated in populations who live in poor sanitary conditions ²⁸.

Among the lower socioeconomic groups and those living in unsanitary conditions, the breast-fed infant is more likely to survive . The potential life saving and protective effects of breast milk against enteric pathogens associated with severe diarrhea are most strongly demonstrated in developing countries or where there is not a safe supply of potable water and effective disposal of human waste ²⁶.

So the greater mortality observed for non breast-fed than for breast-fed babies appears to corroborate the slogan “ bottles kill babies ” ²⁹ .

It was found that breast-feeding improves child survival, reduces infectious disease morbidity such as diarrhea and acute lower respiratory infection however the evidence for a protective effect of breast-feeding against diarrheal mortality is stronger than that available for ARI ³⁰.

Also it is documented that human milk protects infants from diarrhea during the first 6 months of life. Protection against campylobacter infection was associated with the presence of antibody to glycine acid extractable common antigen of campylobacter in human milk ³¹.

A decreased incidence of otitis media in the first year of life has been reported in infants breast-fed exclusively for at least 4 months and similarly, reduction in the incidence of pneumonia, bacteremia, meningitis, and reduced frequency of a certain chronic diseases in later life ²⁶.

Retrospective epidemiologic studies suggested that breast-fed infants were at less risk for developing type 1 diabetes mellitus, lymphoma or Crohn's disease later in childhood ²⁸.

Immunoglobulins (IgA, IgM, IgG) are present in breast milk in greater amounts during the first 4 to 6 days and then decrease significantly with time but IgA is the predominant immunoglobulin in both colostrum and mature milk. These immunoglobulins provide local intestinal protection against gastrointestinal viruses and bacteria such as poliomyelitis and Escherichia coli ³².

Human milk contains bacterial and viral antibodies, including relatively high concentrations of secretory antibodies, which prevent microorganisms from adhering to the intestinal mucosa. Growth of the mumps, influenza, varicella, rota virus and Japanese B encephalitis viruses can be inhibited by substances in human milk. These ingested antibodies from human colostrum and milk may provide local gastrointestinal immunity against organisms entering the body via this source. It was also found that transfer of tuberculin responsiveness by breast milk suggests passive transfer of T-cell immunity. Maternal renal allografts have a better survival in individuals who were breast-fed rather than non breast-fed ²⁶.

(2) Anti- Inflammatory and Anti-Allergic Advantages :

Recent in vitro and in vivo experiments support the concept that human milk is anti-inflammatory as it contains the following anti-inflammatory agents: some classical nutrient and anti-microbial agents,

other compounds that are anti-phlogistic, enzymes that degrade mediators of inflammation, growth factors and cytoprotective agents²⁸.

Macrophages normally present in human colostrum and milk may be able to synthesize complement, lysozyme, and lactoferrin. Breast milk is also a source of lactoferrin, the iron-binding whey protein that is normally about one third saturated with iron, which has an inhibitory effect on the growth of *Escherichia coli* in the intestine²⁶.

(3) Nutritional Advantage :

Current research findings support the conclusion that human milk constituents are not interchangeable with those of other nutrient sources and the clinical nutritionists recommend human milk as the ideal food for full-term infants basing on the concept that human milk constituents play unique dual roles: the classically recognized role associated with most nutrients, that is, the provision of enzymatic cofactors or substrates for energy or structural components, and a complex functional role in which constituents complement the developing abilities of maturing infants. Each of the major classes of organic nutrients is represented in human milk. Proteins provide amino acids for growth, but they occur as polypeptides that aid digestion, host defense, and other functions. Fat provide energy, but some also have antiviral properties. Carbohydrates provide energy but also may enhance mineral absorption, modulate the growth of bacteria, and prevent the attachment of selected bacteria to epithelial cells along the respiratory and gastrointestinal tracts, which are exposed to human milk at each nursing³³.

In recent years special attention has been given to the nutritional and physiological value of the long chain polyunsaturated fatty acids (LCPs) present in human milk. It was found that arachidonic acid (AA) which is one of the most important n-6 LCPs and docosahexaenoic acid (DHA)

which is one of the most important n-3 LCPs are of major importance for growth and development of the brain and nervous system. During the first 3-4 months of life also recent studies have revealed impaired visual function in human infants fed formulas deficient in omega-3 fatty acids while breast-fed infants obtain essential fatty acids and LCPs in sufficient amount. The average human colostrum contains the recommended level and balance of the essential fatty acids required by the newborn baby³⁴.

Also colostrum contains a higher ash content and higher concentrations of sodium, potassium, chloride, protein, fat-soluble vitamins, and minerals than mature milk³².

However although the human milk has low proteins content than other milks it was found that this is of great metabolic and nutritional advantages because a high protein intake in the infancy will lead to a burden on the liver and kidney function and – also lead to pathologic amino acids patterns in the plasma indicating a metabolic disturbance which may have an impact on organ function³⁵.

(4) Psychological and Bonding Advantage :

Breast-feeding has been referred to as the period of “ exterior gestation “ because it provides continuity with the intrauterine environment while providing security and nourishment. It has been suggested that secretion coupled with sensory input from the baby produces “ mothering ” responses in most women. Many women who have raised both breast-fed and bottle-fed infants state that they feel a special closeness to the breast-fed child that has persisted into adult life³⁶.

Mother who breast-fed her baby, gaining both a feeling of being essential and a sense of accomplishment. The infant is provided with a close and comfortable physical relationship with the mother. Breast-

feeding offers increased opportunity for close sensual contact between the mother and the infant²⁶.

As maternal–infant attachment is a natural, unconscious process between a mother and infant it is noted that early maternal–infant separation adversely affects the attachment process. However skin –to- skin positioning of mother and infant is perceived as a positive and personally beneficial experience in immediate post-partum period Further research suggests that parents who hold their infant skin-to-skin frequently reflect feelings of stronger identity with the knowledge of their infant²⁷.

Studies suggest that early and intimate tactile, and visual contact are important in determining the quality of attachment and mothering which is provided the infant²⁶.

So the short term psychologic effect of breast–feeding is early mother and infant contact. The “ en face ” position of breast–feeding enhances this contact. The long term psychologic effect of unrestricted nursing appears to be a more even mood cycle as a result of elevated prolactin levels which enhance coping mechanisms associated with caring for a new family member³².

(5) Child Spacing Advantage :

Breast–feeding plays a major role in child spacing where a number of studies have demonstrated that the longer the duration of breast–feeding; the longer is the interval between the last birth and the next pregnancy³⁷.

Each month of exclusive breast-feeding increases the average birth interval by as much as 15 days so in countries where contraceptive use is not regular practice , breast–feeding is credited as a major mechanism in achieving birth intervals of up to 30 months³⁷.

Lactation Amenorrhea Method (LAM) is the absence of menstruation due to breast–feeding³⁸. The endocrine basis of lactation

amenorrhea is that prolactin secretion occur in response to suckling and its plasma level is related to the frequency and duration of suckling as well as the postpartum interval ³⁹.

Hyperprolactinemia act in both at the level of the hypothalamus and on the ovaries, itself is responsible for inhibition of ovarian function often observed during lactation ⁴⁰.

(6) Economic Advantage :

The income of most families in the developing countries does not allow the spending of large sum of money on buying milk powders to make feeds for the baby. Cow's milk production in developing countries is so little that milk powder production can't be considered except in one or two countries. Because these products have to be imported, developing countries have to use their merge supplies of foreign exchange money to buy the milk powders from the developed countries. So the costs of artificial feeding in developing countries are very high in respect of the financial cost to the family and to the country ⁴¹.

Also the decrease in infant morbidity among breast-fed infants leads to a decrease in health care cost. Increased cost of health is one factor that is especially important in developing countries that can't afford the increased economic demand produced by high infant morbidity rates ²⁷.

So breast-feeding is cheaper, not only for the actual milk, but also due to the fact that paraphernalia such as teats and bottles are not required and neither is sterilization of food ⁴².

(7) Other Advantages :

*** Breast-feeding benefits for infants with special needs :**

- Infants with Down Syndrome :

Breast milk provides those infants added protection when their mothers are exposed to virus so her body makes antibodies towards it that appear in the breast milk. Due to the easy digestion of breast milk and because it is one of the best laxatives around so it is helpful for infants with bowel problems related to Down syndrome. Due to skin-to-skin contact of B.F. additional stimulation is provided to infant with low muscle tone. The oral facial muscles are stimulated more with B.F than with bottle-feeding. Mouth and tongue, coordination are improved with breast -fed infants which promotes their speech and language development as they grow ⁴³ .

- Infants with cleft lip/palate :

Breast feeding provides protection from ear infections and most other types of infection, which is an added benefit for an infant facing surgery ⁴⁴ .

Feeding breast milk, versus formula, can keep from irritating mucus membranes as choking and milk leaking into the nose are common with infant with cleft lip/palate because it is natural body fluid .B.F aids the muscle in the baby's mouth and face to become stronger and more developed contributing to more normal facial muscle formation. Also breast nipple is more flexible than a rubber nipple and will mold itself to compensate for abnormalities in the lip or mouth ⁴⁵ .

- Infants with neurological impairment :

B.F. help the baby to develop and improve coordination of his muscles and nervous system as the jaw and mouth movements are necessary for effective B.F. ⁴⁵ .

*** Breast–Feeding thermoregulation and glycemic control :**

It is stated that, “at birth, cold stress and the work of respiratory activity and skeletal muscle result in increased energy demand. The newborn must then call upon stored fuels to raise the blood glucose”.

However it was found that newborns that were placed skin–to skin did not experience a drop in body temperature and “ infants became significantly warmer during breast-feeding than during bottle feeding". A research study examines thermoregulation and blood glucose values of newborns breast-fed in the skin–to-skin position compared with formula–fed newborns under radiant warmers found that both groups of newborns maintained mean blood glucose values well within the accepted normal range. It is interesting to note that two newborns in the radiant warmer formula-feeding group failed to maintain minimum temperature values of 97.7°F, with one newborn’s temperature dropping to 95.5°F, despite the well–controlled nursery environment, while all newborns in the skin-to-skin breast-feeding group during the immediate recovery period will maintain body temperature ²⁷.

*** Breast–feeding and cancer risk :**

It has long been held that “the breast, which has never been called upon for normal function is more liable to become cancerous". It has noted that lactation may play a modest or indirect part in reducing the risk of breast cancer for both pre and postmenopausal women. Another study indicated a definite association between a long experience of lactation and decreased risk of breast cancer. This trend was particularly marked in premenopausal women. Other study noted a decreased risk of breast cancer in Chinese women who had breast–fed their children for more than 6 months ⁴⁶.

Also several authors have found that there is decreasing risk of epithelial ovarian cancer and border line epithelial ovarian neoplasms with increasing length of lactation ⁴⁷ .

***Breast-Feeding against osteoporosis and post-partum hemorrhage:**

It was reported that B.F lower the maternal risk for osteoporosis and control post-partum hemorrhage and anemia ⁴⁸ .

Breast-Feeding Categories and Patterns :

The definitions of breast-feeding categories described in a report adopted by the world health organization and the participating agencies in 1991 (all of which apply to the 24-hour period preceding the enquiry) are as follow :

(1) Exclusive Breast-Feeding: The infant has received only breast-milk from his/her mother or a wet nurse, or expressed breast-milk, and no other liquids or solids with the exception of drops or syrups consisting of vitamins, mineral supplements or medicines .

(2) Predominant Breast-Feeding: The infant's predominant source of nourishment has been breast-milk. However, the infant may also have received water and water-based drinks(sweetened and flavoured water , teas , infusions, etc) ; fruit juice ; oral rehydration salts (ORS) solution; drops and syrup forms of vitamins, minerals and medicines; and vritual fluids (in limited quantities). With the exception of fruit juice and sugar-water, no food-based fluid is allowed under this definition:

1/Breast-feeding : the child has received breast-milk (direct from the breast or expressed) .

2/Complementary Feeding : the child has received both breast - milk and solid (or semi – solid) food .

Bottle – Feeding : the child has received liquid or semi-solid food from a bottle with a nipple/teat .Although bottle-feeding is not strictly a “ breast-feeding ” category , it was considered essential to include it among the key indicators because of its impact on breast-feeding ⁴⁹ .

PROBLEMS IN BREAST FEEDING

1. Contraindications to breast feeding:

1- Maternal Causes :

(A) Permanent Causes :

Active tuberculosis, severe haemorrhage, typhoid fever and malaria are permanent contraindications to nursing as are chronic poor nutrition, debility, severe epilepsy, neuroses, postpartum psychosis and severe systemic disease such as cardiac failure, thyrotoxicosis or neoplasia ⁴² .

Pregnancy is an indication of weaning as the strain of feeding the baby as well as nourishing the foetus is an unusually heavy one . Breast-Feeding probably should not be continued beyond the first 20 weeks of gestation ⁴⁹ .

In frequently , allergens to which the infant is sensitized may be conveyed in the milk. In such instances an attempts should be made to find the specific allergen and to remove it from the mother's diet ⁵⁰ .

(B) Temporary causes :

The presence of drugs or harmful contaminant in the mother's milk may necessitate at least temporary cessation of nursing ⁵¹ .

Acute infection in the mother may temporarily contraindicate breast-feeding if the infant does not have the same infection, otherwise there is no need to stop nursing unless the condition of either necessitate it. when the infant is unaffected and the mother's condition permits. The breast may be emptied and the milk is given to the infant ⁵² .

Fissuring or cracking nipple, mastitis and breast abscess may necessitate temporary cessation of breast – feeding until the condition is cured ⁵³ .

2- Causes in the infant :

(A) Permanent Causes :

Phenylketonuria (PKU) is often mentioned as a contraindication to breast-fed. Breast milk, however, has relatively low levels of phenylalanine, in fact, infants who are exclusively breast-fed may receive a phenylalanine intake near the amount recommended for treating PKU. Total or partial nursing can therefore, be encourage through close monitoring of the infant's blood phenylalanine levels ⁵⁴.

Galactosemia is an absolute contraindication to breast-feeding as breast-milk is rich in lactose and the survival of infants with galactosemia depends on receiving non lactose-containing formula ³⁶.

Congenital disease which are likely to be fatal or may endanger the baby's life such as anencephaly, complete cleft palate which may carry the risk of aspiration, are contraindications to breast-feeding ³⁶.

(B) Temporary Causes :

Presence of a mechanical cause such as severe hare-lip or cleft palate. In this condition, feeding by a spoon or dropper is restarted to until the condition is treated surgically ⁵⁴.

Acute illness of the child if feeding from the breast is too tiring for him. In this instances, temporary expression of milk and its feeding to the infant is recommended ⁵⁵.

II . Difficulties in breast-feeding:

(1) Obstacles in the infant : “ inability to suck”:

A very weak and premature infant may not have the strength to suck sufficient milk for his requirements. Certain deformities such as hare-lip or cleft palate may interfere with proper suckling. Cerebral anoxic damage or haemorrhage may cause inhibition of the suckling reflex. Dyspnea associated with respiratory distress syndrome or congestive cardiac failure may be so great that effort involved does not permit the infant to suck adequately. The newborn infant intinctively breaths through the nose, if there is nasal obstruction, the baby will not suck properly and in attempting to do so may become cyanosed. Some of these disabilities in the infant can be rectified, but if not, the breast should be emptied and milk is given by spoon, if this cannot be managed a nasogastric tube should be used ⁴² .

(2) Obstacles in the Mother:

Engorgement of the breast is a common condition and usually occurs on the 3rd – 5th day. The main cause is blockage of ducts by epithelial secretions and debris. Other causes are excess of milk or weak suckling baby. It can be prevented by squeezing the breast once or twice during the last 2 months of pregnancy, and applying a firm binder. This condition is an important cause of failure of lactation. The best way to overcome it is to evacuate the breast completely after each feed by squeezing ⁵³ .

Twin pregnancy: The mother can nurse one baby and give the other an artificial feed and this occurs alternatively, i.e. the baby who has the breast will take artificial feeding the next time and vice versa. If one of the twins is very weak, he should take the breast all the time and the other will take artificial feeding ⁵⁶ .

Fissuring or cracking of the nipple is a painful condition liable to occur about the end of the first week and is often a sequel to engorgement. Hardening of the nipples by the application of spirit is a possible cause and so is lack of cleanliness. The baby should be taken off the affected breast but milk can be expressed and fed to the infant until healing takes place⁵³.

Mastitis is a breast infection in which the breast is tender, hot and distended with milk and fever may be present. It can be alleviated by continued and frequent nursing on the affected breast to keep it from becoming engorged, local heat applications and antibiotics. Discontinued feeding cause increased stasis and further pain⁵⁵.

Delayed appearance of milk is an obstacle causing difficulty in breast-feeding. In this condition insist on breast-feeding until milk appears. If it is greatly delayed, complementary feeds may be given. Delay in secretion of milk may occur in mothers after caesarean section or if there has been an element of shock during labour⁵⁵.

III. Medicines and nursing mothers:

Most medications have not been tested in nursing women, so no one knows exactly how a given drug will affect a breast-fed child. Since very few problems have been reported, however, most over-the-counter and prescription drugs, taken in moderation and only when necessary are considered safe. Even mothers who must take daily medication for conditions such as epilepsy, diabetes, or high blood pressure can usually breast-feed. They should first check with the child's pediatrician, however, to minimize the baby's exposure, the mother can take the drug just after nursing or before the child sleeps⁵⁷.

In the January 1994 issue of Pediatrics, the American Academy of Pediatrics included the following in a list of drugs that are usually compatible with breast-feeding:

- * acetaminophen * many antibiotics
- * antiepileptics (although one , Primidone , should be given with caution)
- * most antihistamines
- * alcohol in moderation (Large amount of alcohol can cause drowsiness , and abnormal weight gain in an infant)
- * most anti hypertensives
- * aspirin (should be used with caution)
- * caffeine (moderate amounts in drinks or food)
- * codeine * ibuprofen
- *decongestants * insulin
- * quinine *Thyroid medications

Other drugs that are not safe while nursing :

- * Bromocriptine (Parlodel)
- * Most chemotherapy drugs for cancer
- * Ergotamine (for migraine headaches)
- * Methotrexate (for arthritis)

- Drugs of abuse:

Some drugs such as cocaine can intoxicate the baby. Others such as amphetamines, heroin can cause a variety of symptoms including irritability, poor sleeping patterns, tremors, and vomiting. Babies become addicted to these drugs .

- Tobacco smoke :

Nursing mothers should avoid smoking. Nicotine can cause vomiting, diarrhea and restlessness for the baby, as well as decreased milk production for the mother. Maternal smoking or passive smoke may increase the risk of sudden infant death syndrome (SIDS) and may increase respiratory and ear infections ⁵⁷ .

- **Aspirin and breast feeding :**

Aspirin is transferred to breast milk and it is estimated that a nursing baby receives about 4-8 % of the mother's dose. In some countries, nursing woman are advised against aspirin use because of the possible development of Reye's Syndrome in their babies. The world health Organization (WHO) working Group on human lactation considers aspirin intake by nursing mothers as unsafe ⁵⁸.

Weaning

According to the recommendation of the world health organization, children should be exclusively breast-fed for the first 6 months of life. Exclusive B.F. in the first 6 months will be beneficial to both the infant and mother, particularly in developing countries, by avoiding potential sources of contamination and resultant infant diarrhea, maximizing intake of human milk and lengthening the duration of post-partum amenorrhea and thus birth interval ⁵⁹.

Although nearly all mothers in developing countries breast-feed, few do so exclusively. Most supplement their milk with water or teas, frequently from the first week of life. They do so believing that such fluids will relieve pain (especially colic and earache), prevent and treat colds and constipation, sooth fretfulness, and, specially, quench thirst .However supplementing breast milk in the first six months of life is unnecessary and may be harmful. Exclusively breast-fed infants benefit most from the protection that breast-feeding offers against diarrhea. Supplementing breast milk with water or teas significantly increases the risk of diarrhea ³⁰.

Even it was found that the use of additional water may not be necessary during rehydration and maintenance therapy of breast-fed children ³⁰ .

Furthermore many mothers introduced solids their infants prior to 6 months because they believed that infants should learn how to eat other foods,to acclimate the stomach and learn to differentiate flavors . However there is no advantages for early supplementation even in infant energy intake or growth ⁶⁰ .

The introduction of solids into an infant's diet should balance nutrient needs with a variety of foods and textures while encouraging feeding skills development. The goal of weaning is the transition from a

liquid diet to a well- balanced table food diet . Readiness generally occurs during the first 4-6 months of life, but observations of physical and psychologic development are better determinants of readiness than age alone ⁶¹ .

Weaning has had many definitions—changing feeding from breast to cup, from breast to bottle, from bottle to cup, from milk to solids. The definition most widely used today is " the process of introducing any non milk food into the infant diet irrespective of whether or not breast or bottle feeding continues" ⁶² .

Time of beginning weaning :

Around 4-6 months of age, an infant learns oral and gross motor skills that aid in accepting solid foods. Oral motor skills have evolved from the reflexive suck to the ability to swallow non liquid foods, and to transfeere food from the front of the tongue to the back. Gross motor advancement includes sitting independently and maintaining balance while using hands to reach and grasp objects. At this stage the infant is ready to sit in a high chair and grasp pieces of food ⁶³ .

Independent eating behaviors are encouraged as the infant advances from reflexive and imitative behaviors to more independent and exploratory behaviors. This transitional milestone occurs sometime during the fourth month of life ⁶⁴ .

By 6 months, an infant is able to indicate a desire for food by opening his or her mouth, leaning forward to indicate hunger, and leaning back and turning away to show disinterest or satiety. Until an infant can express these feelings, feeding of solids will probably represent a type of forced feeding, potentially leading to overfeeding and obesity ⁶¹ .

There are good reasons to begin to wean most infants between 4 and 6 months, so that a considerable energy intake from foods other than milk

has been established early in the second half of the first year. It is about 6 months that the volume of milk needed to sustain adequate growth become difficult for infants to tolerate. Deficiencies of iron and vitamins may also begin to develop after 6 months in wholly breast-fed infants. Infants of 5 months onwards start putting objects in their mouth. It is appropriate that some of these objects should be edible. At this age also, teeth begin to erupt and infants develop the ability to chew. Delayed in feeding chewable food may result in delayed development of chewing⁶².

In addition to determining the quantity of feedings, the infant should be encouraged to develop more independence with feeding in the following ways:

- * self feeding of soft finger foods.
 - * sipping from a cup by 6-8 months of age.
- * holding the bottle or cup independently.
 - * controlling the timing of feeds in an effort to promote self regulation of hunger and satiety⁶⁵.

Later in infancy, a variety of foods is introduced into the diet. These introductions of unfamiliar foods are noteworthy as they allow the infant to gain experience with various tastes and textures promoting successful weaning to the family diet⁶⁶.

The importance of diversifying the diet at specific intervals during the infant's psychologic development can be observed in deprived environments in which the eating pattern is unvaried and monotonous, or where weaning is delayed. Both of these situations fail to stimulate interest in solid foods or self feeding⁶⁷.

Time of complete weaning :

The tradition in most of the world is to breast-feed for 2-3 years . complete weaning is rather “ natural ” at this age. since a child between 2 and 3 years can feed himself and eat a full adult diet. he also has teeth and can walk and talk a little and thus express wishes and disagreements. The mother, too, may again become pregnant at this time such that her attention will need to be directed toward the new infant ³⁶.

In general, the time of complete weaning varies from 1 – 1.5 years and it should not exceed 2 years ³⁶.

How to Carry Weaning :

Many detailed systems and charts for introducing semi-solids and solids to diet are available. In general , at about 4 months of age a small amount of semi-solid food should be offered on a small spoon. this food is usually in the form of oatmeal or corn, cereal, vegetable or fruit such as pulped apple or banana. The baby should have his milk feed first at this stage. Once the infant begins to chew and swallow , a small amount of plain vegetable puree may be added, and by 4-5 months a rusk may be chewed from time to time. By 6 months of age various forms of meat such as chicken and beef may be eaten as finely minced or pulped product Egg yolk may be added from 5-6 months onwards ⁴².

In general, there are no strict rules for carrying weaning. This differs from child to the other according to his appetite and if he likes or dislikes a certain type of food. Weaning should be gradual. Any food should be offered in gradual manner until the child likes the food, once this occurs, the new food should be given at frequent intervals so that the liking is not lost, and not to introduce new foods more often than every 1-2 weeks. New foods are best accepted if they are fairly thin or diluted. The amount of it should not be precisely determined but should be left to the infant's appetite ⁵².

Side-effects that may occur during weaning:

Many nutritional problems arise with the introduction of solids. Obesity and hypernatraemia are the commonest in western society due to early and excessive use of solids. In developing countries energy and protein intake may be reduced with cessation of breast feeding and lead to protein-energy malnutrition (PEM). Iron deficiency, rickets and scurvy may develop in all societies at this time unless supplements are added to foods ⁵.

In addition, in developing countries, introduction of solid foods introduce the risks of gastrointestinal infection and parasitic infestation because of the heavy contamination of foodstuffs with infecting organisms, or a result of large-dose antibiotics. Diarrhea lasting more than 4 days, or resulting in greater than 10% dehydration may still require intravenous fluid therapy. The AAP recommends the reintroduction of age-appropriate foods and Liquids after a brief rehydration period, Continued breast feeding is beneficial, despite controversial concerns related to secondary lactose intolerance during acute diarrhea ⁶⁸.

Food refusal can occur in infancy because of physical or emotional stress and is more typically classified as organic indicating a medical etiology, or functional, referring to environmental influences. The consequences of this problem is failure to thrive ⁶⁹.

Prevention of breast feeding tragedies:

Although successful breastfeeding compelling advantages to infants and mothers, inadequate breastfeeding may result in critical infant failure to thrive and hypernatremic dehydration. The consequences of inadequate intake of breast milk range from hyperbilirubinemia, infant hunger, and slow weight gain to lifethreatening, and even fatal, dehydration and starvation. Unfortunately, breastfeeding tragedies tend to be viewed as exceptionally rare, isolated events rather than as the extreme spectrum of a clinical continuum of suboptimal nutrition in breastfed infants ⁷⁰.

***Parental attitudes and misbeliefs that contribute to breast feeding Tragedies:**

Intense commitment to breast feed:

Ironically, the mothers whose infants are most likely to suffer breast feeding morbidity often are those who are the most highly motivated to breast feed to give their infants the best. Their strong commitment to the nutritional superiority and health benefits of human milk makes them willing to persevere in the face of lactation difficulties ⁷¹.

Reluctance to use infant formula :

Although many breast feeding women experience insufficient milk production, associated infant morbidity is rare because mothers who perceive their breast infants to be hungry usually start supplementing with formula or switch to formula-feeding, but Parents who are intensely motivated to breast feed often are keenly aware that formula supplements may jeopardize breast feeding success ⁷².

The campaign among many lactation consultants to publicize the health hazards of infant formula and the insistence on referring to formula as " artificial baby milk " and emphasizing its inferiority to human milk may inadvertently contribute to breast feeding tragedies by magnifying

parental resistance to its use, even when medically indicated. Some parents conclude that it is better for their infants to be underfed and receive breast milk only than to consume adequate quantities of nutrients, some of which are contributed by infant formula. They don't appreciate that ideal infant nutrition refers to the quality and quantity of the milk being fed ⁷³.

Exaggerated fear of nipple confusion :

Much has been written about the popular belief that early bottle-feeding of infants will result in nipple confusion. Anecdotal reports exist of infants who were exposed to bottle-feeding before breast feeding and who then displayed a preference for bottle feeding over breast feeding. Cautions appearing in popular breast feeding publications often exaggerate the risks of nipple confusion and fuel parental fears about giving medically indicated supplemental milk by bottle ⁷⁴.

Inability to recognize their infant's malnourished condition :

Probably what has been least understood about breast feeding tragedies is how a parent could fail to see that his or her infant was severely underweight when an objective observer immediately recognizes the problem, however, lack of parental awareness is a common characteristic in reported cases of critical weight loss in breastfed infants. The explanation is that the parent who is with the infant continually may not notice progressive wasting because the infant's gradual weight loss seems subtle when measured day to day. The apparently contented, but wasted infant is especially difficult for parents to recognize as being underfed. Overt signs of hunger, such as excessive crying after feedings have been misinterpreted as colic, intestinal gas, a "high needs" infant or a reaction to maternal allergens in milk. Progressive lethargy has been mistaken for contentment and satiety (e.g. things must be going better because he finally seems satisfied) ⁷⁵.

Failure to use objective measures of infant milk intake :

A breast feeding tragedy may occur when faulty assumptions are made about the amount of milk an infant obtains during a breastfeeding session. Standard advice to improve infant latch on and breastfeed more often does not necessarily deliver more milk to an infant if a mother's supply is profoundly low or the infant is unable to extract available milk. Although some mothers and health care professionals insist that they can estimate how much milk an infant takes with breastfeeding, these guesstimates" often are inaccurate. An accurate estimate of infant milk consumption allows clinicians to tailor a rational feeding plan to ensure that under weight infants receive adequate supplement ⁷⁶.

Infant feeding test weights :

An infant feeding test weighing procedure is a non invasive accurate method of measuring infant milk consumption during a breast feeding session. The identically clothed infant is weighed before and after breast feeding with an electronic infant scale accurate to at least g ⁷⁷ .

Many clinicians who evaluate breast feeding problems rely on test-weight data from a representative breast feeding, together with other measures of breast feeding adequacy, to assess lactation performance and tailor a suitable feeding plan. Intake of breast milk measured by office test weights using a highly accurate integrating balance has been found to be associated with rate of infant weight gain ⁷⁸.

The firmly held belief that more frequent nursing automatically increases a mother's milk production and an infant's milk intake causes inappropriate delays in providing adequate nutrition to underfed infants and increasing a mother's low milk supply. Test weighing of infants show that some infants take negligible milk during a representative breast feeding session, and others lose weight because of insensible water loss and failure

to extract any milk. In such cases, breast feeding more often only stresses a compromised infant without improving the infant's milk intake⁷⁹.

STRATEGIES TO PROMOTE BREAST FEEDING SUCCESS :

Although it may not be possible to prevent every case of insufficient milk supply, breast feeding tragedies are preventable by appropriate education of parents and professionals, vigilant screening for lactation risk factors, early follow-up after hospital discharge, appropriate anticipatory guidance for breast feeding mothers, and timely intervention when ineffective breast feeding is detected. The following practice strategies will help to ensure optimal outcomes in breastfed infants .

- * Encourage expectant parents to attend a prenatal breast feeding class and to become as knowledgeable as possible about breast feeding before delivery .
- * Ensure that pregnant women undergo a prenatal breast examination to screen for anatomic variations that could impact lactation performance .
- * Help mothers to get the best possible start with breast feeding in the hospital setting including hands – on assistance with correct breast feeding technique. Encourage early initiation of breast-feeding, frequent, cue-based feeding, Continuous rooming – in, and avoidance of pacifiers and supplemental feedings unless a valid medical indication exists.
- * Screen mothers and new-born infants for breast feeding risk factors and,when potential problems are detected, arrange for early intervention to maximize maternal milk production and infant milk intake .
- * Whenever a breastfed infant is unable to extract milk regularly and effectively, advise mothers to begin using a fully automatic electric breast pump to express residual milk after nursings. Establishing and maintaining a generous milk supply improves a woman’s chances of overcoming early breast feeding difficulties and also ensures that her infant will be adequately nourished .

- * Encourage new, breast feeding mother to remain in close contact with their infants and to nurse their infants whenever they display hunger, at least eight to twelve times in 24 hours for approximately 10 to 15 minutes per breast, teach mothers the infant behavioral and elimination signs of a well- nourished, breastfed infant. Urge parents to seek medical advice for poor infant feeding, jaundice, or infrequent elimination .
- * Schedule follow-up visits for breast fed newborn infants within 48 hours after hospital discharge. Evaluate the infant's percentage of weight loss from birth weight and assess the frequency and duration of feedings, elimination patterns, evidence of jaundice, and maternal reports of breast feeding difficulties .
- * Provide encouragement for breast feeding women and refer them to peer support groups , where successful breast feeding mothers may serve as influential role models ⁸⁰.

REFERENCES

1. Riordan J ; and Countryman BA: The Anatomy and Psychophysiology of lactation. In: Riordan J; and Auerbach KG ; (eds.) Breast-feeding and Human lactation. Jones and Bartlett publishers. Sudbury, Massachusetts, Boston, London, Singapore, 1993: 75–102.
2. Courtiss EH and Goldwyn RM: Breast sensation before and after plastic surgery. *Plast Reconstr Surg* 1976; 58 (1):1–12.
3. Tyson JE: studies of prolactin in human pregnancy; *AM J obst Gynecol* 1972 ; 113:14–20.
4. Chao S: The effect of lactation on ovulation and fertility, In: Lawrence R, (ed.) *Breast-feeding , Clin Perinatol* 1987; 14 (1) : 39–49.
5. Burman D: Nutrition in early childhood In : Maclaren DS and Burman D., (eds) *Textbook of Pediatric Nutrition , 2nd edition , Churchill Living Stone, 1982: 49–60.*
6. Laukaran VH: The effect of contraceptive use on the initiation and duration of lactation ; *International Journal of Gynecology and Obstetric (suppl.)* 1987; 25: 129–142.
7. Countryman BA: Self care in Riordan J ; (ed.) *A practical guide to breast-feeding , C.V. Mosby Company, 1983: 40–77.*

- 8.** El-Zanaty F ; Hussein E ; Shawky G ; et al.: Egypt Demographic and Health Survey (EDHS), 1995. Calverton, Maryland (USA), National Population Council (Egypt) and Macro International Inc 1996.
- 9.** Hamosh M: Nutrition during lactation; *Bibl Nutr. Dieta.* Basel. Karger. 1996; 53: 23 – 36 .
- 10.** Lawrence RA: *Breastfeeding: A Guide for the Medical Profession* 4th ed . St Louis ; CV Mosby; 1994.
- 11.** Jensen RG: *Handbook of milk composition.* San Diego; Academic press; 1995.
- 12.** Lourdes B ; Butte NF ; Villalpando S ; et al.: Maternal energy balance and lactation performance of meso amerindians as a function of body mass index . *Am J Clin Nutr* 1997; 66: 575–583.
- 13.** Lawrence RA: *Breast feeding ; A guide for the Medical Profession* 3rd ed. St louis ; CV Mosby; 1989.
- 14.** Nehlig A ; and Debry G: Consequences on the newborn of chronic maternal consumption of coffee during gestation and lactation: A Review . *J Am Coll Nutr* ; 1994; 13(1): 6–21.
- 15.** Dewey KG ; Peerson JM ; Brown KH ; et al.: Growth of breast-fed infants deviates from current reference data: A pooled analysis of US, Canadian, and European data sets. *Pediatrics* ; 1995; 96 (3): 495–503.

- 16.** Freed GL ; Landers S ; Schanler RJ : A practical guide to successful breast feeding; Am J Dis child ; 1991; 145: 917–921.
- 17.** Hamosh M: Breast feeding and the working mother, Pediatrics 1996; 97: 492 – 498 .
- 18.** Lawrence RA : Breastfeeding: A Guide for the Medical Profession , 5th ed. St louis ; CV Mosby; 1999.
- 19.** Howard CR ; De Blicke T ; Hoopen CB ; et al.: Physiologic stability of newborns during cup and bottle feeding, Pediatrics; 1999; 104: 1204–1207.
- 20.** Powers N : Slow weight gain and low milk supply in the breast feeding. Clin Perinatol 1999; 26 (399): 429.
- 21.** Powers N ; and Slusser W: Breastfeeding update: II. Clinical lactation management Pediatr Rev 1997 ; 18: 147–161.
- 22.** Schanler RJ: Suitability of human milk for the low birth weight infant, Clin Perinatol 1996 ; 22: 207.
- 23.** Schanler RJ ; Shulman RJ ; Jau C: Growth of premature infants fed fortified human milk (abstract); Pediatric Res 1997; 41: 240.
- 24.** Wauben IPM ; Atkinson SA ; Grad TL ; et al.: Moderate nutrient supplementation of mother’s milk for preterm infants supports adequate bone mass and short-term growth. A randomized, controlled trial . Am J Clin Nutr 1998; 67: 465.

- 25.** Hurst NM ; Valentine C ; Renfro L ; et al.: Skin-to-skin holding in the neonatal intensive care unit influences maternal milk volume; *J Perinatol* ; 1997; 17: 213.
- 26.** Barness LA and Curran JS: Nutrition and nutritional disorder in : Emerson NW; (ed.); *Nelson Textbook of Pediatrics*; 15th edition; Philadelphia ; Saunders company ; 1996: 152–153.
- 27.** Durand R ; Hodges S ; La Rock S ; et al.: The effect of skin to skin breast-feeding in the immediate recovery period on newborn thermoregulation and blood glucose values. *Neonatal Intensive Care*; March/April 1997; 23.
- 28.** Goldman AS: The immune system of human milk: Antimicrobial, anti-inflammatory and immunomodulating properties; *The Pediatrics Infectious Disease Journal* 1993 ;12 (8): 664–672.
- 29.** Habicht JP ; Da Vanzo J ; Butz WP : Does breast-feeding really save lives, or are apparent benefits due to biases. *Am J Epidemiol* 1986 ; 123 (2): 279–290.
- 30.** Yoon PW ; Black RE ; Moulton LH ; Becker S : Effect of breast - feeding on the risk of diarrheal and respiratory mortality in children under 2 years of age in Metro Cebu, the Philippines. *American Journal of Epidemiology* 1996; 143(11):1142–1148.
- 31.** Ruiz-Palacios GM ; Calva JJ ; Pickering LK ; et.al.: Protection of breast-fed infants against campylobacter diarrhea by antibodies in human milk. *J Pediatrics* 1990; 116 (5): 707–713.

- 32.** Gardner SL ; O'Donnell JP ; Weisman LE : Breast-feeding of the sick neonate. In: Merenstein GB and Gardner SL ; (eds.) Handbook of Neonatal Intensive Care, St Louis , CV Mosby Company, 1989: 238–260.
- 33.** Garza C ; Schanler RJ ; Butte NF ; Motil KJ : Special properties of human milk; Clinics in Perinatology 1987 ; 14(1):11–32.
- 34.** Ronneberg R and Skara B: Essential fatty acids in human colostrum ; Acta Paediatr 1992; 81: 779–783.
- 35.** Hambraeus L: Human milk: Nutritional aspects . In Brunser O; Carrazza FR; Gracey M ; Nichols BL ; Senterre J ; (eds.). Clinical Nutrition of the Young Child, New York, Raven Press, 1991: 289–301.
- 36.** Worthington–Roberts BS and Lynda ET: Guidance for lactating mothers In: Worthington–Roberts BS; Vermeersch J and Williams SR; (eds.) Nutrition in Pregnancy and Lactation, 3rd edition, Times Mirror/Mosby College publishing , 1985): 304–368.
- 37.** Bongaarts J and Potter RG: Fertility, biology, and behavior. An analysis of the proximate determinants, Academic Press, New York, 1983: 230.
- 38.** WHO: Working Group. Bennet PN (ed). Drugs and Human lactation. Esvier , Amsterdam, New York , Oxford , 1988: 325–6.
- 39.** Delvoe P; Delogne-Desrook J; Robyn C: The influence of the frequency of nursing and of previous lactation experience on serum prolactin in nursing mother ; J Biosoc Sci 1997; 9: 447–451.

40. Nc Neilly AS : effect of lactation on infertility; Br Med Bull 1997; 35: 151–154.
41. Omololu A: Significance of breast-feeding in developing countries . Environmental Child Health , October 1975: 270–272.
42. Arneil GC and Stroud CE: Infant-feeding In: Forfar JO and Arneil GC; (eds) Textbook of Pediatrics, 3rd edition, Churchill living stone, 1984; 1: 259–277.
43. Mohrbacher N; and Stock J: The Breast–feeding Answer Book Franklin Park ; Illinois, La leche league international 1991; 480: 327–339.
44. Danner S and Cerutti E: Nursing your baby with a cleft palate or cleft lip, Rochester, New Yourk, Childbirth Graphics 1990.
45. Paradise JL ; Elster BA ; Tan L: Evidence in infants with cleft palate that breast milk protects against otitis media. Pediatrics 1994; 94:853–860.
46. Mansfield CM: a review of the etiology of breast cancer. Journal of the national medical association 1993 ; 85 (3): 217-221.
47. Rosenblatt KA ; Thomas DB ; The WHO Collaborative Study of Neoplasia and steroid Contraceptives: Lactation and the risk of epithelial ovarian cancer. International Journal of Epidemiology 1993 ; 22 (2): 192–197.

- 48.** Gartner SL: Breast-Feeding the infant with special Physical and Developmental Needs. Nutrition Focus 1996; 11(4):1–7.
- 49.** WHO: Report summarizes the discussion and consensus reached on breast-feeding indicators derived from household survey data. CDD /SER/91.14 , Geneva 1991.
- 50.** Barnes LA : Nutrition and nutritional disorders in : Nelson Textbook of Pediatrics; 13th edition; Behramn RE; Vector C; Vaughan III; (eds.); W.B; Saunders company; 1987: 125.
- 51.** Lawrence RA: A Review of the medical benefits and contraindications to breastfeeding in the United States. Maternal and Child Health Technical Information Bulletin–Arlington, VA, National Center for Education in Maternal and Child Health 1997.
- 52.** Beudry M ; Dufour R ; Maicouxs B: Relation between infant feeding & infections during the six month of life ; J. Pediatrics 1995; 126: 191–197.
- 53.** American Academy of Pediatrics: A woman’s giude to breast feeding, Elk Grave Village, American Academy of Pediatrics 1998.
- 54.** Clark BJ: After a positive Guthrie what next ? Dietary management for the child with phenylketonuria ; Eur J Clin Nut (suppl) 1992 ; 96: 33–39.
- 55.** WHO: Collaborative study Team on the Role of Breast feeding on the prevention of Infant Mortality: Effect of breast feeding on infant and

child mortality due to infectious disease in less developed countries : A pooled analysis. Lancet 2000; 355 : 451–455.

- 56.** Neifert MR: Infant problems in breast feeding In: lactation physiology, nutrition and breast feeding. Edited by Neville M.C; Neifert M.R ; Plenum press 1983: 364 – 381.
- 57.** American Academy of Pediatrics: Committee on Practice and Ambulatory; Recommendations for preventive Pediatric health care; Pediatrics 1995 ; 96: 375.
- 58.** WHO: Breast-feeding and child spacing : what health workers need to know . MCH/FP/88.1; Geneva 1988.
- 59.** Cohen R and Martek MB : The impact of two corporate lactation programs on the incidence and duration of breast-feeding by employed mothers. American Journal of Health Promotion 1994; 8 (6): 436–441.
- 60.** Cohen RJ ; Haddix K ; Hurtado E ; Dewey GK: Maternal activity budgets: Feasibility of exclusive breast-feeding for six months among urban women in Honduras. Soc. Sci. Med. 1995; 41 (4): 527–536 .
- 61.** Tsang R ; Zlotkin SH ; Nichols BL ; et al.: Nutrition During Infancy. Principles and Practice 2nd ed. Cincinnati OH; Digital Education publishing 1997.
- 62.** Poskitt EME: Weaning In: Practical Pediatric Nutrition; edited by poskitt EME ; Butterworths; London ; 1988: 73–79.

- 63.** Cloud H : Feeding Problems of the child with special health care needs:
In Ekvall SW; Pediatric Nutrition in chronic Diseases and
Developmental Disorders. Prevention, Assessment and Treatment.
NewYork ; Oxford University Press 1993.
- 64.** Marlow D: Textbook of Pediatrics Nursing. 6th ed. Philadelphia , PA ;
WB Saunders Company 1988.
- 65.** Chatoor I ; Hirsch R ; Persinger M : Facilitating internal regulation of
eating : A treatment model of infantile anorexia; Infants Young child
1997; 9 (4): 12–22.
- 66.** Underwood B: Weaning practices in deprived environments: the
weaning dilemma. Pediatrics (suppl) 1985 ; 75: 194.
- 67.** Pipes P ; and Trahms CM: Nutrition in Infancy and Childhood . 5th ed .
St Louis , CV Mosby 1993.
- 68.** Moutos D: Diarrhea. Building Blocks for life. Pediatric Nutrition
Practice Group; Chicago; American Dietetic Association ; 1996: 20–3.
- 69.** Burklow KA ; Phelps AN ; Schultz JR ; et al.: Classifying complex
pediatric feeding disorders. J Pediatric Gastroenterol Nutr 1998 ; 27:
143 – 147.
- 70.** American Academy of Pediatrics: Work group on Breast feeding:
Breastfeeding and the use of human milk. Pediatrics 1997; 100:1035–
1037.

- 71.** La leche League International: The woman Art of breastfeeding ; ed. 6 ; Schaumburg , La leche league International, 1997 ; 76: 137, 326.
- 72.** Renfrew M ; fisher C ; Arms S: Bestfeeding: Getting breast feeding right for you berkeley, CA , Celestial Arts, 2000: 127.
- 73.** Marshall WN : Why use the word “ formula” Pediatrics 1997; 99: 309.
- 74.** Neifert M ; Lawrence R ; Seacat J : Nipple confusion: Toward a formal definition ; J. Pediatrics (suppl) 1995; 126: 125–129.
- 75.** Cooper WO ; Atherton HD ; Kahana M ; et al.: Increased incidence of severe breast feeding malnutrition and hypernatremia in a metropolitan area. Pediatrics 1995; 96: 957–960.
- 76.** Meier PP ; Engstrom JL ; Crichton CL ; et al.: A new Scale for in–home test–weighing for mothers of premature and high risk infants. J Hum Lact 1994 ; 10 : 163–168.
- 77.** Meier P ; Engstrom JL ; Fleming BA ; et al.: Estimating milk intake of hospitalized preterm infants who breastfeed. J hum lact 1996 ; 12: 21–26.
- 78.** Huggins K ; Petok E ; Mireles O : Markers of lactation insufficiency, a study of 34 mothers, Current Issues in lactation. 2000; 1: 25–35.
- 79.** Krebs N ; Reidinger C ; Robertson A ; et al.: Growth and intakes of energy & zinc in infants fed human milk; J. Pediatr. 1994 ; 124: 32–39.

- 80.** American Academy of Pediatrics: Work group on Breast feeding: Ten steps to support parents, choice to breastfeed their baby Pediatric Clinics of North America 2001; 8 (2): 533.
- 81.** Fomon SJ : Nutrition of Normal Infants. St Louis ; Mosby ; 1993.
- 82.** Fomon SJ : Infant Nutrition. 2nd ed. philadelphia ; Pa ; WB Saunders Company; 1974 .
- 83.** Fomon SJ ; Sanders KD ; Zeigler EE : Formulas for older infants, J Pediatr 1990; 116: 690–696 .