

“Why Colostrum Feeding is Important in Maternity Homes”

N.B.Kumta,

Chief Coordinator Breastfeeding Promotion Network of India. Former Chief, Genetics Division, Paediatric Research Lab, K.E.M. Hospital, Dept. of Paediatrics, K.E.M. Hospital, and Seth G.S. Medical College, Mumbai.



N. B. Kumta

“A pair of substantial mammary glands have the advantage over the two hemispheres of the most learned professors brain in the art of compounding a nutritive fluid for infants.”

Oliver Wendell Holmes: *Hambraeus L* 1984 Human Milk Composition

Reviews in Clinical Nutrition Nutr Abstr Rev 1984, 54(4), 219 – 236.

Protective role of colostrum, mature milk and immunity:

Veterinarians have known the urgency of the offspring's receiving the early milk of the mother. Death among newborns not suckled at the breast is at least five times higher than among those who receive colostrum and mother's milk. Evidence that lack of breastfeeding and poor environmental sanitation has a pernicious synergistic effect on infant mortality (Lawrence, 1994). The newborn does not have sufficient innate defences to protect himself against the contaminated environment he enters from the usually sterile environment of the uterus. The incidence of infection in the newborn infant is significant. It has been estimated that upto 10% of newborns are infected during delivery or in the first few months of life (Habicht et al, 1988) (Chen et al, 1988). It is generally believed that the newborn cannot muster the same level of defence

against infection that an adult is capable of developing. The diminished phagocytic function of newborn cells is an example. This maturational defect is attributed to both cellular and extracellular factors grouped as antibody and non-antibody. A secretory IgA immunoglobulins are found in human milk and provide local protection on the mucous membranes of the gastrointestinal tract from birth through early months of life. Mucosal immunity has become the subject of extensive research (Kirtpatrick, 1971). The data produced suggest that there may be considerable traffic of cells between secretory sites. These data support the concept of a general system of mucosa associated lymphoid tissue (MALT) which includes the gut, lung, mammary gland, salivary and lacrimal glands and the genital tract. This concept of MALT implies that immunization at one site may be effective means of producing immunity at distant sites. The ability of epithelial surface exposed to the external environment to defend against pathogens has been well established for gastrointestinal, genitourinary and respiratory tracts. The common defence is secretory IgA. Direct contact with the antigen and the lymphoid cells of the breast is unlikely, but there is a considerable trafficking of cells between secretory sites that makes it possible for producing immunity or sIGA in breast milk (Glass 1983), (Ogra SS & Ogra PL, 1978), (Ogra SS & Ogra PL, 1978).

Colostrum – a nature's perfect gift for the newborn baby (3 to 5 days):

Placenta and colostrum are the nature's perfect gifts. Colostrum provides a newborn with complete food and protects the baby from nosocomial infections due to nasty bacteria in the milieu of maternity homes and last but not the least provides warmth and caring environment. Bottle feedings with artificial milk (Infant milk substitute or cow's milk) is considered to be more scientific, modern and convenient by the poorly informed mothers and health workers. Hence colostrum feeding is an endangered practice in many maternity homes.

Colostrum essential for Exterogestate foetus:

The mother has protected the foetus all through the pregnancy by the nature's unique gift – "the placenta." The placenta allows provisions of best nutrients and protective anti-infective factors through breast milk and the child grows well without catching any infections from the new extrauterine pernicious contaminated environment. Derick B. Jelliffe coined the word "Exterogestate foetus" suggesting that the newborn still needs protection similar to intrauterine protection (Jelliffe DB and Jelliffe EFP, 1978). Species specific, tailor made human milk is best suited for the infants of particular age – viz age specific.

Anti-infective Factors in Colostrum : are 1. Lactoferrin (binds iron), 2. Bifidus factor (Lactobacillus bifidus decreases growth of pathogens), 3. Unsaturated fatty acids (protects against Giardia Lambia), 4. Antibodies and non-specific factors against viruses, 5. Lactoperoxidase, 6. Interferon, 7. Chemotactic factors and complements are some of the immunoregulatory mediators (Pickering & Kohl, 1986).

Colostrum and Bifidus Flora:

Colonisation of the newborn gut with Lactobacillus bifidus flora and antibody early ensures safety from harmful bacteria entering the newborn gastro-intestinal tract and colonising. Colostrum facilitates the establishment of bifidus flora in the digestive tract. Colostrum also facilitates the passage of meconium – cathartic effect. Meconium contains an essential growth factors for Lactobacillus bifidus and is the first culture medium in the sterile intestinal lumen of the newborn infant. Human colostrum is rich in antibodies, which may provide protection against the bacteria and viruses that are present in the birth canal and associated with other human contact. True induction of lactation occurs in the second day viz, 32 to 40 hours postpartum. Colostrum's high protein and low fat is in keeping with the needs and reserves of the newborn at birth. The colostrum may actually reflect a transitional maternal blood picture, which is associated with nitrogen metabolism of the postpartum period. The postpartum

period is one of involution of body tissue and catabolism of protein in the mother.

Colostrum and Lactoferrin:

Lactoferrin of the colostrum is an iron binding protein that has strong bacteriostatic effect on staphylococci and E coli and candida albicans, apparently by depriving the organism of iron. Lactoferrin is less than 50% saturated with iron in human milk. It is high in colostrum – 600 mg/100 ml. However lactoferrin does not combine with iron in human milk as it is bound to fat and casein and not lactoferrin.

Colostrum and Interferon:

The cells in the colostrum secrete an interferon like substance with strong antiviral activity upto 150 NH units/ml. Interferon is a potent stimulator of leukocytes' cytotoxicity in the absence of antibodies.

Colostrum and cellular components:

The cellular components of milk are macrophages, lymphocytes, neutrophils, and epithelial cells. The overall concentration of these leukocytes is of the same order of magnitude as that seen in peripheral blood, although the predominant cell in milk is the macrophage rather than the neutrophil (Pitt J, 1979). Macrophages comprise about 90% of the leukocytes, and 2000 to 3000/mm³ are present. Lymphocytes make up about 10% of the cells (200 to 300/mm³). 50% are T cells and 34% B cells. They synthesize IgA antibody for total cells. Count drops to 20% on the 5th Day. Milk provides a site for local humoral or cell-mediated immunity induced at a distant site such as the gut with the reactive lymphoid cells migrating to the breast. Colostral macrophages are a vehicle for storage and transport of immunoglobulin. Macrophages biosynthesize lactoperoxidase and cellular growth factors. Colostrum also contains 100000 to 5 x 1000000 leukocytes/ml and 40 to 60% are polymorphonuclear (PMN). The function of PMN includes microbial killing, phagocytosis, and chemotaxic responsiveness. (Bhaskaram P & Reddy V, 1981), (Goldman 1993), (Head JER & Beer AE, 1978), (Lawrence 1994).

Colostrum Feeding and Bonding:

Colostrum feeding helps a mother and baby to develop a close, and loving bond. Having a close relationship with his/her mother may help a child to form good relationship with other people. It helps the child to develop normally. Mother and newborn baby are very sensitive to bonding and no time should be lost in bonding by taking the child out of delivery room for giving bath. Baby besides the mother reduces the pain during stitching of episiotomy wound. Newborn baby is kept on the mother's chest soon after mopping and ensuring good Apgar score soon after delivery. If a mother bottle-feeds her baby, it is easier to give the baby to someone else to feed, or to leave the bottle besides propped up, so that he feeds himself. The baby may get less affection and stimulation from mother and there is no bonding if prelacteal feeds are given by a nurse through the bottle.

Colostrum feeding and the Mother's health and pregnancy:

Colostrum feeding helps to stop bleeding after delivery and it helps the mother to regain her normal figure. Involution of the uterus to its normal size occurs early and blood loss through lochia is minimised and the mother is less likely to suffer from iron deficiency. Frequent breastfeeding helps to protect against another pregnancy.

Colostrum feeding and Intestinal growth – Epidermal growth factor (EGF):

Colostrum is rich in EGF, which stimulates the baby's immature intestine. EGF stimulates the proliferation of epidermal and epithelial tissues like growth and maturation of the pulmonary epithelium, stimulation of ornithine decarboxylase activity and DNA synthesis in the digestive tract, and acceleration of the healing of wounds of the corneal epithelium. EGF when taken orally by the newborn infant is stable in acid, and resistant to trypsin digestion. EGF causes hyperplasia of the enteric mucosa when colostrum fed compared with formula-fed. EGF is a major growth-promoting agent in breast milk – promoting normal growth and functional maturation of the intestinal tract and pulmonary epithelium.

Variations in composition of milk and Infant specificity:

The variations in human milk are infant specific and age specific. Preterm milk is best suited for preterm babies. Preterm milk is (1) higher in protein, taurine, IgA lactoferrin (2) Lower in Lactose (3) Higher in antioxidants (betacarotene), inositol (4) Lower in calcium phosphorus (Narayanan et al, 1981). Colostrum is all that is needed for the newborn babies adapting to the new environment in the first 3-5 days – transition and mature milk thereafter. Fore milk and hind milk are for thirst and hunger respectively. Babies grow better when hind milk is given.

Composition varies with the stage of lactation, the time of day, the sampling time during a given feeding, maternal nutrition, and individuals. Fat content changes during a given feeding increasing almost three times the concentration at the end of feeding. Fat content rises from early morning to midday. The consistently identifiable stages of human milk are colostrum, transitional milk, and mature milk, and their relative contents are significant for the newborn infant and its physiological adaption to extrauterine life.

Human colostrum is known to differ from mature milk in composition, both in the nature of its components and in the relative proportions of these components. Table I & II. The mean energy value is 67 kcal/100 ml compared with the 75 kcal/100 ml of mature milk. The volume of colostrum secreted increases gradually over a period of 5 days. The volume also varies with the parity of the mother particularly those who have nursed infants previously. The yellow colour is due to B-carotene. It is high in protein, low in fat, and lactose solution. It is rich in immunoglobulins, especially sIgA. The number of immunologically competent mononuclear cells is at its highest level.

Colostrum feeding – Beliefs and Practices:

There are many studies to show that there is a delayed

Table I
Composition of human colostrum and mature breast milk

Constituent (per 100 ml)		Colostrum 1-5 days	Mature Milk > 30 days
Energy	kcal	58	70
Total solids	g	12.8	12.0
Lactose	g	5.3	7.3
Total nitrogen	mg	360	171
Protein nitrogen	mg	313	129
NPN	mg	47	42
Total protein	mg	2.3	0.9
Casein	g	140	187
Lactalbumin	mg	218	161
Lactoferrin	mg	330	167
IgA	mg	364	142
Amino acids (total)			
Arginine	mg	-	52
Isoleucine	mg	121	67
Leucine	mg	221	110
Lysine	mg	163	79
Phenylalanine	mg	105	44
Threonine	mg	148	58
Tryptophan	mg	52	25
Valine		169	90
Total fat	g	2.9	4.2
Fatty acids (% total fat)			
C20 and C22 Polyunsaturated		10.2	2.9
Cholesterol	mg	27	16
Vitamins Fat soluble			
Vitamin A (retinol equivalents)	µg	89	47
β-Carotene	µg	112	43
Vitamin E (total tocopherols)	µg	1280	315
Water soluble			
Vitamin B12	ng	200	26
Minerals			
Sodium	mg	48	15
Potassium	mg	74	58
Chlorine	mg	91	40
Trace elements			
Zinc	µg	540	166

(Lawrence, 1994)

(Table II) Fat distribution in milk.

	Colostrum	Postpartum Transitional	Mature
Fat (%)	2	2.9	3.6
Fat (g)	2.9	3.6	3.8
Lipid g/dl	3.16	3.49	4.14
Phospholipid (mg/dl)	35	31	27
Percent of total lipid	1.1	0.9	0.6
Cholestrol (mg/dl)	29	20	13.5

Colostrum is rich in fat-soluble vitamin A, Carotenoids, and vitamin E. Vitamin A level on the third day can be three times, and carotenoids ten times and Vitamin E three times greater than in mature milk.

starting of the colostrum feeding, colostrum is discarded or not given at all for various reasons. Gopalan Study of 1984 (Gopalan et al 1984) revealed that there was a delayed initiation of breastfeeding upto 24-74 hours in most cases so also a study by Gupta in 1992 (Gupta et al 1992) which showed that in 42.5% of the cases there was a delayed initiation of breastfeeding to more than 24 hours. Prelacteal feeds are started and bottle-feeding is initiated (Table III, IV & V).

Mother's beliefs and practices: most of the time are not conducive to colostrum feedings. Reasons given:

- (1) Colostrum is stale milk. It is thick yellow and like pus (witch's milk). Milk has not come in and breast milk is inadequate, the baby is not satisfied, and few prelacteal feeds given initially are not harmful.
- (2) Breastfeeding is delayed for 24, 48 or 72 hours or more sometimes. Supplements like Jaggery water, glucose water, honey water, ritual fluids are given.

Health worker's – Beliefs and Practices:

Even many health workers (obstetricians and paediatrician, resident doctors and nurses) start prelacteal top feeds. They do not put the child to the breast for early breastfeeding. Reasons given:

- (1) There is no let down reflex and breastmilk takes time to come in sufficient quantity.

- (2) The mothers need or demand rest after the delivery.
- (3) Child cries out of hunger.
- (4) Mother has engorged breast and child is just not able to breastfeed.
- (5) The child is preterm, small for date or low birth weight and hence cannot suckle at the breast effectively.
- (6) The small for date baby may go into hypoglycemia.

Bottle feeding with special milk formulas namely infant milk substitutes is considered by health workers to be a superior, scientific, modern and convenient way of feeding by the nurses, which satisfies all the above needs. This change in the attitude of the health workers has developed as a result of aggressive and unethical marketing of infant milk substitute and providing an alternative method of feeding during first 3-5 days.

Breast Fullness and Breast Engorgement : can be a problem in colostrum feedings in the first week. Breast engorgement is an accumulation in the breast of increased amounts of blood and other body fluids, as well as milk. For some mothers the breasts become only slightly full, while for others they become very full, tender and lumpy. Engorgement may cause the nipple to flatten, making it difficult for the baby to nurse effectively.

The following measures will help relieve the problem, usually within 24 to 48 hours:

- I. Apply moist heat to the breast 3 to 5 minutes before

Table III
Selected towns of Maharashtra

Initiation of Breast milk	
* Within 1 hour	6.5%
* 1 to 6 hours	14.3%
* 7 to 24 hours	24.9%
* 1 to 3 days	44.6%
* 3+ days	9.5%
(Mothers interviewed)	2043 (%)

Operation Research Group
Rapid Assessment of Women & Child in Selected Towns of Maharashtra Table 5.1, P 40.

Table IV
India : Initiation of Breastfeeding

* within 1 hour of birth	9.5%
* from 1 hour to 24 hours	16.8%
* within 24 hours of birth (incl. Within 1 hour)	26.3%
* breastfeeding beyond 24 hours	73.7%

(National Family Health Survey 1992-93)

Table V
Practice of squeezing first milk from the breast

* In every state	40%
* Punjab	93%
* Jammu	88%
* Mizoram, Orissa	79%
* Arunachal Pradesh	44%
* Kerala, Nagaland	49%

(National Family Health Survey, 1992 – 93.
International Institute for Population Sciences, Bombay)

- feeding, followed by gentle massage and stroking the breast towards the nipple.
- By hand or breast pump, express enough milk to soften the areola enabling proper attachment.
- Nurse frequently, every 2-2.5 hours or sooner for at least for 15-20 minutes per side after letdown has occurred.
- Feed the baby in a quiet, relaxing place.
- Paracetamol is needed to relieve pain in the breast.

Colostrum and insufficient breastfeeding jaundice: is an exaggerated physiologic early onset jaundice caused by poor fecal excretion of bilirubin due to insufficient feeding. Approximately 3% of breastfed infants will have bilirubin greater than 15.7 mg/dl. It is usually present on 3-4 days of life early in the first week. The peak occurs on the fourth day of life and lasts from 1-2 weeks. Factors leading to increased bilirubin are lack of breast milk and poor feeding and water supplementation. There is lack of stooling with inefficient breast feeding.

Prevention:

- Demand feeding, at least 8-12 feedings/24 hrs day and night.
- Effective breastfeeding.
- No supplementary fluids.
- Feed expressed breast milk if needed to increase volume of intake and do not stop breastfeeding
- Prohibit complementary or supplementary fluids. The nursing staff should give support for frequent effective suckling (jaundice of any type) rarely requires interruption of breastfeeding.

Indicators of adequate colostrum and transition milk:

- Letdown sensation in mother's breasts during suckling.
- Audible swallowing during a feeding.
- Breasts full before feeding and softer afterwards
- Wet nappies/ diapers less than 6 times for the first few days and later more than 6 times.
- Bowel movements several times a day-commonly with every feed.
- Contented baby between feeds.
- Average weight gain 18-30 gm. per day (3/4 to 1oz per day) 125-210 gm. per week (4-7oz. per week).

Sometimes engorgement of the breast can result in sore nipples, mastitis or breast abscess.

Breast Milk Jaundice:

One in two hundred mothers have a substance, which

(Table VI)
Systemic Characteristics of Breast Fullness and Breast Engorgement.

Systemic Characteristics	Breast fullness	Breast Engorgement **
On set of symptoms	2-4 days	2-10 days
Site	Bilateral	Bilateral
Swelling	Generalized	Generalized
Heat	Occasional	Generalized
Pain	Non-rare	Generalized
Palpation of breast	Soft	Hard
Breast tenderness	None	Generalized
Body temperature	< 38 C	> 38.4 C
Maternal symptoms	Feels well	Breast tightness, discomfort

Lawrence RA 1994 Breastfeeding: A Guide for the Medical Profession St. Louis MO, 1994, CV.

Table (VII)
Hyperbilirubinemia while breastfeeding:

Early jaundice Insufficient Breast feeding Jaundice	Late jaundice Breast milk Jaundice
Occurs 2-5 days of age Transient - 10 days More common in primipara Infrequent feeds	Occurs 5-10 days of age Persists > 1 month All children of a given mother Milk volume not a problem May have abundant milk.
Stools delayed/infrequent Receiving H2O or D5W Bilirubin peaks < 15 mg/dl Treatment none or phototherapy	Normal stooling No supplements Bilirubin may >20 mg/dl Treatment : phototherapy Disc. breastfeeding Rarely exchange transfusion
Associations low Apgars, H2O, or D5W supplement prematurity	None identified

results in indirect bilirubinemia. It does not cause kernicterus. It does not need exchange transfusion. (Table VII).

In conclusion:

Colostrum is not only rich in nutrients but also in immune factors. It imparts immunity to the child against various diseases at an early age. It provides "infants first

immunization." Maternity home, health workers should provide extra support for her to successfully breastfeed for 3-5 days. Initial good start paves the way for maintenance of effective breastfeeding. Colostrum feeds are as important or even more important than some of the latest antibiotics nowadays used prophylactically in preventing infection of the newborn. Breastfeeding reduces intensity of jaundice, septicemia, necrotising enterocolitis, viral and bacterial infection. In addition it

facilitates epidermal and epithelial growth and function.

References:

1. Bhaskaram P and Reddy V: Acta Paediatr Scand 70:87, 1981.
2. Chen Y, Yu S, and Li W: Paediatrics 81:58, 1988.
3. Glass RI: N Engl J Med 308:1389, 1983.
4. Godman AS. Paediatr Infect Dis J 12:664-1993
5. Gopalan C, Gore MS, Ramaswami MA, Choudhari SN, Gopukar PV: Infant feeding practices with special reference to the use of commercial infant food NFI. Scientific report No. 4 Nutrition Foundation of India, India International Centre, New Delhi 1984.
6. Gupta A, Sobti J, Rohde JE. Indian J Paediatr 59:193, 1992.
7. Habicht J-P, DA Vanes J and Butts WP: Paediatrics 81:456, 1988
8. Head JR and Beer AE: The immunologic role of viable leukocytic cells in mammary exosecretions. In Larson BL, editor: Lactation, vol IV, Mammary gland/human lactation/milk synthesis, New York, Academic Press Inc, 1978.
9. Jelliffe DB and Jelliffe EFP: Human Milk in the Modern World. Oxford 1978, Oxford University Press.
10. Kirtpatrick CH: J Infect Dis 124:539, 1971.
11. Lawrence RA Breastfeeding – A Guide for the Medical Profession, Fourth edition St. Louis, Mo. CV Mosby Co: Chapters 4, 5, 1994.
12. Narayanan I, Prakash K, and Gujral VV. J Paediatr 99:496, 1981
13. Ogra SS and Ogra PL: J Paediatr 92:546, 1978
14. Ogra SS and Ogra PL: J Paediatr 92:550 1978.
15. Pickering LK and Kohl S: Human Milk Humoral Immunity and Infant Defence Mechanisms. In Howell RR, Morriss RH Jr. and Pickering LJK, editors. Human milk in Infant Nutrition and Health Springfield III, Charles C Thomas, Publisher, 1986
16. Pitt J: Paediatrics Suppl 64:745, 1979.