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Clinical lactation practice: 20 years of evidence

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Clinical Lactation Practice: 20 Years of Evidence

Karen Wambach, Suzanne Campbell, Sara Gill, Joan Dodgson, Titi Abiona , and M. Jane Heinig

International Board Certified Lactation Consultants come from many backgrounds including nursing, midwifery, medicine, medical and nursing education, public health, occupational therapy, anthropology, dietetics and nutrition, speech therapy and pathology, physical therapy, and social work. As practitioners devoted to promoting and supporting breastfeeding among childbearing women, lactation consultants depend on a vast multidisciplinary knowledge base to support their practices, with evidence-based knowledge considered the gold standard.¹

Over the past twenty years there has been an evolution of methods used in breastfeeding related research. This evolution has been a product of several factors including: 1) an increased knowledge base which results in the increased use of controlled experimental designs;^{2,3} 2) increased attention to definitions of infant feeding practices⁴ and outcomes; 3) increased opportunities for funding (affecting methods, sample size, and sophistication); and 4) multi-disciplinary collaboration. As the evidence for breastfeeding/human milk's health benefits has grown, so have the efforts to improve breastfeeding rates and duration. In this review, we will summarize the major findings of research investigations conducted within selected areas (health outcomes, factors associated with initiation and duration of breastfeeding, common problems, special populations, and infant feeding practices in developing countries) during the last 20 years.

For this review, the English language scientific literature (CINAHL, MedLine, Cochrane Database of Systematic Reviews) was searched for relevant articles published since 1985.

Health Consequences of Infant Feeding Practices for Mothers and Infants

Since 1985, there have been significant advances in our understanding of health outcomes associated with breastfeeding. Human milk confers protection to the infant against infectious agents by a unique blend of bioactive constituents that work alone or in combination to develop and enhance the infant's immature immune system.⁵ Research into these factors, their functions, and sites of action continues today. Human milk contains soluble and cellular factors from the maternal immune system, antimicrobial substances and developmental factors that assist the infant to resist infection.⁶ Examples of some of these constituents may be found in Table 1. The protection conferred by human milk is unique for each mother and infant because the exposure of the mother to environmental antigens results in the transfer of immune factors to the milk that are specific to these antigens.^{7,8}

Epidemiological studies support the association between breastfeeding and reduced infant morbidity and mortality in both developing and industrialized nations, particularly against otitis media and gastrointestinal and lower respiratory illnesses.^{5,9-12} In early studies, the ability of researchers to find differences between breastfed and artificially fed populations was challenged by the classification of infants as "breastfed" no matter how much or little breast milk they had received. In those early studies, infants who breastfed only once or twice often were grouped with infants who were exclusively breastfed for several months.¹⁰ In 1990, Labbok and Krasovec published a classification

schema of infant feeding practices to be used by researchers examining the impact of breastfeeding on both mothers and infants.¹³ A modified scheme for classifying infant feeding was later adopted and disseminated by the World Health Organization.¹⁴ It is now known that examining not only if an infant was breastfed but how (in terms of duration and exclusivity) is essential to our understanding of the impact of breastfeeding on human health. The evidence indicates that the greatest protection conferred by breastfeeding against infectious illness occurs when breastfeeding is exclusive and continues for at least 3 months.⁵ Based on extensive evidence related to the advantages of breastfeeding for infant health and development, it was concluded by many health organizations including the WHO¹⁴ and the American Academy of Pediatrics,¹² that exclusive breastfeeding should continue for the first 6 months of life. Continued breastfeeding, with complementary foods is encouraged for at least 12 months and as long as is desired.

Human milk is also associated with improved health in premature infants,¹⁵ and higher scores on tests of cognitive function than those of artificially-fed preterm infants.^{16,17} In a meta-analysis of studies among preterm low-birth weight infants, those who received donor milk were 3 times less likely to develop necrotizing enterocolitis than those who received formula.¹⁸ Further work is needed to examine the effects of breast milk feeding among very-low-birth weight infants.¹⁹

Evidence indicates that breastfeeding may be protective against chronic disease, such as some childhood cancers,²⁰ atopic disease,^{21,22} diabetes,²⁰ and childhood obesity.²³ Breastfeeding is also associated with higher cognitive development scores

among term infants as compared to artificially-fed infants among many but not all studies.²⁴⁻²⁶

For mothers, breastfeeding results in both short and long term physiological benefits. Initially, breastfeeding causes the uterus to contract, reducing the mothers' risk for postpartum hemorrhage and hastening her recovery from labor.²⁷ With increasing duration of breastfeeding, mothers gain protection from postpartum weight retention,²⁸ breast cancer,²⁷⁻²⁹ and in some studies, ovarian cancer.³⁰ Among populations that do not use hormonal contraceptives, breastfeeding serves as an important method of contraception.²⁷

Despite all the knowledge that we have gained in the past 20 years about the impact of breastfeeding on the infant and mother, many families still choose not to breastfeed. The identification of factors associated with breastfeeding initiation and duration has been another important area of research.

Getting Mothers Started: Factors and Interventions Associated with Breastfeeding Initiation

The factors associated with initiation of breastfeeding have been widely researched using various quantitative (e.g., large-scale national surveys, regional and local observational studies) and qualitative (e.g., descriptive experiences of mothers, healthcare providers, etc.) methods. Maternal experiences, personal, socio-cultural and economic characteristics and types of support available (e.g., informal, formal and environmental) have been explored. Many researchers have agreed upon maternal characteristics (i.e., mothers who are older, better educated, more affluent, and married) and personal attributes (e.g., positive attitudes and beliefs toward breastfeeding,

persistence, confidence) most often associated with breastfeeding initiation.³¹⁻³⁵

Negative breastfeeding experience is associated with choosing not to breastfeed subsequent children.³⁶

Mothers' need to return to work during the early postpartum is a barrier to breastfeeding³⁷⁻⁴¹ and may particularly affect women working in conditions where pumping is not a feasible option.⁴² However, in some non-Western countries more affluent women choose not to breastfeed as a sign of their wealth.^{43, 44}

Researchers have identified the lack of informal (e.g., family, social network), formal (e.g., healthcare providers) and environmental (e.g., places to breastfeed while out of the house, public media) support as negatively affecting breastfeeding initiation.^{41,45-48}

Interventions intended to increase breastfeeding initiation have yielded mixed results. National media campaigns have been used internationally to improve public perceptions about breastfeeding.⁴⁹ Prenatal education and peer support also are interventions widely associated with increasing breastfeeding initiation rates even among groups who do not typically choose to breastfeed.^{33,41,50-53} However, these programs have not been consistently effective.^{33,54-55} Socio-economic disparities may affect a woman's access to prenatal breastfeeding education.⁵⁶ While still lower than the general population, US women who have traditionally breastfed at lower rates (i.e., teenaged, African American, participants in WIC or Medicaid, those who obtain late prenatal care or have an infant in NICU) are initiating breastfeeding in greater numbers^{57,58} perhaps due to increased public and private breastfeeding promotion programs.⁵⁸ Similar results have been reported in countries where hospital practices have actively incorporated the Baby-Friendly Hospital Initiative.⁴¹ Our knowledge about what is most effective in

promoting breastfeeding initiation would be improved if more rigorous research was done on various interventions.⁹

Increasing Duration and Exclusivity of Breastfeeding: Factors and Interventions

Surveillance of national rates of exclusive breastfeeding is included in the WHO Global Data Bank on Breastfeeding.⁵⁹ An issue in conducting research measuring breastfeeding exclusivity is the inaccuracy of maternal recall.⁶⁰ Factors associated with duration of exclusive breastfeeding are similar in many countries. Among US women, duration of exclusive breastfeeding is associated with primiparity, non-Hispanic African American ethnicity, less than 20 years of age, lower income, lower education and type of employment.⁶¹ A population-based survey in Quebec, Canada found maternal age to be the predominate determinant of exclusivity.⁶² An increased risk of early weaning occurs with maternal smoking according to a meta-analysis of the effect of smoking on breastfeeding.⁶³

Some researchers have examined the factors influencing breastfeeding duration by using psychosocial theories (e.g., theory of planned behavior, attachment, self-efficacy) that hypothesize the relationships between internal psychological and external socio-environmental influences on women's infant feeding behaviors.^{32,34, 64-66} They report increased breastfeeding duration is associated with positive intention, attitudes, beliefs, and increased social support.

Health education programs regarding the benefits of breastfeeding have been effective in increasing breastfeeding initiation rates, but much less effective in maintaining duration and exclusivity.^{33,45} Supportive early postpartum experiences, particularly while in the hospital, have been associated with increased duration and length

of exclusivity.⁴⁵ Breastfeeding support also has been cited as a post-discharge intervention effective in increasing both duration and exclusivity, particularly when obtained from a health care provider.⁶⁷ Lay breastfeeding support has not been as effective,⁶⁷ though support from teams of professional health care providers and lay/peer counselors have been successful in increasing breastfeeding duration.^{68,69} Lack of skilled professional support also is a factor in early weaning and decreased exclusivity.^{70,71} Improving our understanding of how best to facilitate exclusive breastfeeding is an essential area for future research.

The Science of Breastfeeding Support: Advances in Our Knowledge of Mammary Physiology

While many of the major structures of the mammary gland were described more than 50 years ago, advances in technology have led to a greater understanding of mammary function at the cellular and molecular levels.⁷² Extensive work has been ongoing to gain greater understanding of the anatomy and variation in the functioning mammary gland as well as the nature of the functions of the gland, control over those functions, and the interaction of the gland with the rest of the body.⁷²⁻⁷⁴

Much of what we know about the onset of milk production and control of milk volume is based on research that was conducted in the last 20 to 25 years. Hartmann and others have divided the onset of milk production (lactogenesis) into 2 parts, stages I and II.^{75,76} During stage I which occurs during pregnancy, mammary gland structures are differentiated into functional cells capable of secretion, and plasma concentrations of lactose and α -lactalbumin increase. Glandular secretion is inhibited by progesterone and to a lesser extent, estrogen. Though high levels of prolactin are needed for lactogenesis,

the surge in prolactin that occurs after parturition is not likely the trigger for milk onset.⁷⁷ Colostrum is secreted during pregnancy and in the early postpartum period. Colostrum is higher in protein, minerals and immune factors, and lower in fat as compared to mature milk.⁷⁸

During stage II, there is an onset of copious milk production that occurs in the first 4 days postpartum, as progesterone levels drop 10 fold. There are rapid changes in milk volume and composition and the transition from colostrum to mature milk occurs on a continuum. Mammary structures continue to change resulting in reduction in permeability of the paracellular pathway between epithelial cells (junctions) and increased secretion of all milk components. As lactation progresses, prolactin levels fall and are not correlated with milk volume. A complex system of hormonal interactions is needed to maintain lactation⁷⁴ and autocrine systems adjust milk volume in response to milk removal by the infant.⁷⁶

Milk secretion and plasma changes occur whether or not women choose to breastfeed, suckling and milk removal are not necessary for lactogenesis II to occur. However, if milk removal does not occur around day 3 postpartum, milk secretion will typically decline. Time of first breastfeeding and frequency of breastfeeding on day 2 are positively correlated with milk volume on day 5. Formula feeding prior to lactogenesis is associated with significant delay onset of stage II, suggesting that milk removal is important in increasing the efficiency of milk secretion.⁷⁹ Other factors associated with delay of milk onset include primiparity, maternal body mass index greater than 27 kg/m², placental retention (progesterone), cesarean section delivery, and elevated cortisol (stress during parturition).^{80,81}

Delay of lactogenesis is only one of several challenges commonly faced by lactating women. An understanding of the nature of these challenges is needed to enhance the support of the breastfeeding dyad.

What Are The Most Common Challenges For Breastfeeding Mothers?

A number of maternal and infant based concerns or problems may be encountered during breastfeeding and adversely affect breastfeeding success. Maternal based concerns include sore nipples, engorgement, mastitis, and perceived or actual insufficient milk supply. Due to space constraints, infant based concerns such as suck disorders and hyperbilirubinemia will not be addressed in this paper.

Sore nipples are one of the most common reasons that women discontinue breastfeeding in the early postpartum period.⁸²⁻⁸³ Although some research has suggested that nipple changes in the first weeks of breastfeeding are common and normal,^{84, 85} more often, faulty breastfeeding techniques, including improper positioning, latch-on, and artificial nipple use, are implicated in nipple trauma and pain.⁸⁶⁻⁸⁸ Staphylococcus infection also is associated with sore, cracked nipples.⁸⁹ Oral anomalies, including ankyloglossia, and suckling disorders in the infant have also been implicated in the development of sore nipples.^{90,91}

Clinical trials conducted internationally to investigate the effectiveness of various treatment methods for sore nipples such as lanolin, hydrogel dressings, tea bag and water compresses, expressed breast milk, air-drying, breast shells, and education have had mixed results. Results of trials testing lanolin nipple ointments, alone, or in comparison to other preparations have demonstrated neutral results,^{92,93} negative results;⁹⁴ and positive results.⁹⁵ Breast infections have been associated with both lanolin⁹⁴ and hydrogel

dressings.⁹⁵ Lavergne⁹⁶ found that tea bag and water compresses were more effective than no treatment, and there was no statistically significant difference between the two types of compresses. Future research should include multiple methods of treatment, in addition to, and separately from education interventions.

Engorgement is also a problem that breastfeeding mothers experience. Descriptive research by Humenick and colleagues^{97,98} described patterns of engorgement and identified correlates of significance (initiation of feeding, frequency of feedings, feeding duration, rate of milk maturation, and supplementation). Clinical trials to test various methods of engorgement treatment have been conducted. A meta-analysis by the Cochrane Review group reviewed eight trials, involving 424 women.⁹⁹ No overall benefit was identified in three different studies that used cabbage leaves or cabbage leaf extracts. Ultrasound treatment and placebo were equally effective. Use of Danzen (an anti-inflammatory agent) significantly improved the total engorgement symptoms when compared to placebo as did bromelain/trypsin complex. Oxytocin and cold packs had no apparent effect on engorgement symptoms. Additional research is needed in prevention and treatment of engorgement.

Lactation mastitis is a common inflammatory condition of the breast with prospective descriptive studies reporting incidences of 9.5% to 23.7% over periods of 3, 6, and 12 months postpartum.¹⁰⁰⁻¹⁰³ Risk factors identified in prospective research include a history of mastitis with a previous child, cracked and sore nipples, and plugged ducts.^{101,103-105} Most commonly, *Staphylococcus aureus* is the causative organism.^{89,105-107} Often occurring early in the puerperium, the onset is generally abrupt, and causes significant discomfort and disruption for the breastfeeding mother;¹⁰⁸⁻¹⁰⁹ sometimes

leading to weaning.^{100,103,105,109} Mastitis recurrence is common.^{100,103,109} Mothers report the most common and effective means of self-care include breast massage, frequent feeding from the affected breast, bed rest, analgesics/anti-inflammatory agents, hot packs, and compliant antibiotic use.^{108,109}

Insufficient Milk is consistently reported as the most common reason for weaning. The problem is one of complexity and crosses international, cultural, and socioeconomic lines.¹¹⁰⁻¹¹³ Early work in describing the phenomenon occurred concurrently and prior to the establishment of ILCA (and this literature review boundary). However, research related to biological and behavioral predictors of milk volume has been ongoing with notable work conducted in the 1990s.¹¹⁴⁻¹²² More recently, psychological factors such as maternal confidence and self-efficacy have been investigated.^{64, 122} Efforts to systematically reduce the incidence of insufficient milk have been employed through efforts such as ILCA's *Evidence Based Guidelines For the First 14 days of Life*.¹²³ However, no clinical trial with the primary aim of preventing or treating insufficient milk was found.

How Do We Best Promote and Support Breastfeeding In Special And Vulnerable Populations?

Preterm / Very Low Birth Weight (VLBW) Infants

Research-based knowledge in the area of breastfeeding and the premature/very low birth weight infant has increased phenomenally over the past twenty years. The preterm infant has very special needs and research continues to produce evidence of the superiority of human milk for the preterm infant in comparison to commercially prepared preterm formula in the areas of host defense, gastrointestinal function, nutrition, and neurodevelopment.¹²⁴ Although mothers of preterm infants face numerous challenges in

providing their own milk for their infants.^{125, 126} they report that their efforts are outweighed by the rewards.^{127,128}

Seminal early work in the 1980's provided much needed evidence to demonstrate the physiologic ability of preterm infants to suckle at the breast without physiologic compromise in comparison to bottle-feeding.¹²⁹⁻¹³¹ Concurrently and thereafter, research relative to milk expression via pumping added to the knowledge base for NICU lactation support teams.¹³²⁻¹³⁴ Because of preterm infants' special nutrition and caloric needs, the science of lacto-engineering was used to enhance the milk fat content in human milk.¹³⁵ Efforts to improve milk transfer using special devices such as nipple shields also were examined¹³⁶ as were optimal support strategies for mothers of non-nursing preterm infants.¹³⁷ Research on the use of kangaroo-care for enhancing breastfeeding in the preterm infant has also grown in recent years.¹³⁸⁻¹⁴⁰ Additionally, information regarding the behavioral responses of the preterm infant to breastfeeding has enhanced the holistic lactation care of the preterm infant and mother.¹⁴¹⁻¹⁴⁴

Adolescent Mothers

Typically, breastfeeding initiation rates and duration among adolescent mothers are lower than among adult women. Although health care professionals and others may question teen mothers' maturity and commitment to breastfeeding,¹⁴⁵ teenage mothers are physiologically able to lactate as well as their adult counterparts and without ill effects to their own physical growth and development.¹⁴⁶⁻¹⁴⁹ The benefits of human milk are especially important in this vulnerable population because infants of teenage mothers are hospitalized in the first year of life more often than infants of older mothers, often for infections such as gastroenteritis.^{150,151}

Research indicates that teenagers' attitudinal, social, ethnic/racial, perceived control, and commitment factors are influential in choosing breast or bottle-feeding.¹⁵²⁻¹⁵⁹ Teens breastfeeding experiences and challenges are often similar in nature to those of adult women including physical breast discomforts,^{152,160-162} concerns about insufficient milk^{147,160-162} and fatigue.¹⁶¹ Breastfeeding problems thought to be more specific to adolescent mothers include modesty issues, maintenance of breastfeeding after return to school, trouble expressing breast milk, and maternal sleep interruptions.^{147,152,160-163} Teens also report the positive aspects of breastfeeding, including the closeness of the nursing relationship or bonding,¹⁶³ and ease.¹⁶⁰ Finally, reasons for weaning identified in the teen mother include: infant related reasons such as improper latching to the breast;¹⁶³ a demanding, unsettled, or rejecting infant;^{147, 162} insufficient milk supply and baby liking the bottle better;^{152,162} and social influences such as inaccurate advice, relatives' and doctors' advice to quit, embarrassment, and work or school barriers.^{152,160,162}

Very few clinical trials focusing on promotion and support of breastfeeding in teens have been conducted. Using a combination of education and professional and peer counseling, Volpe and Bear¹⁶⁴ demonstrated an increase in breastfeeding initiation to 65% ($p < .001$) from the previous rate of 14% (historical control group). Therefore, additional clinical trials using developmentally appropriate interventions are needed to enhance breastfeeding initiation and duration in teenage mothers.

The effect of ethnicity and low-income on breastfeeding

Researchers have emphasized the important influence of cultural influences on breastfeeding practices.¹⁶⁵⁻¹⁷¹ Cultural understanding can be very important in promotion of breastfeeding initiation and is essential to providing services.¹⁷⁰ Unfortunately, few

reports have been published describing culturally relevant modes of information and service.^{41,172,173}

According to the 2001 U.S. National Immunization Survey, non-Hispanic blacks had the lowest rates of breastfeeding initiation and continuation in the US. Exclusive breastfeeding rates were also lowest in this group.¹⁷⁴ African American women stated that they did not breastfeed for the following reasons: loss of breast shape; insufficient milk supply; loss of freedom; perception that partner doesn't like it; and public embarrassment.¹⁷⁵ The prenatal period may be the most important time to impress black women with the benefits of breastfeeding.¹⁷⁶

Breastfeeding rates are also low among Hispanic women in the US.¹⁷⁷ The more acculturated Hispanic women are to the United States, the less likely they are to breastfeed.^{172,177,178} Age, degree of acculturation, and marital status were significantly associated with breastfeeding initiation, while education and income were not associated with initiation among a group of Hispanic women on the Texas/Mexico border.¹⁷⁸

Hispanic women in the US are aware of the benefits of breastfeeding, but knowledge of benefits to the mother and baby may not overcome perceived problems such as pain, embarrassment and inconvenience.^{179, 180} In addition these low-income mothers identify several concerns related to breastfeeding including lack of confidence, loss of freedom, lifestyle restrictions, and lack of support from family and friends.¹⁸¹

Research identifies the women least likely to breastfeed as young, low-income members of ethnic minorities and those who lack support for breastfeeding.^{45,182} Women at risk of premature cessation decide to breastfeed later in their pregnancy, demonstrate a negative attitude toward breastfeeding, positive attitudes about bottle feeding, and have a

low confidence in their ability to breastfeed.^{45, 183} Early weaning was also associated with an intention to breastfeed a shorter period of time, lower breastfeeding knowledge scores, perceived insufficient milk supply, and plans to work outside the home.¹⁸³ Other studies have examined who influences low-income, ethnically diverse women's decisions regarding infant feeding choices, such as mothers and WIC personnel.^{152,184} Studies indicate that additional support measures such as peer and paternal support may increase breastfeeding initiation and continuation among low-income diverse populations.¹⁸⁵⁻¹⁸⁶

Health professional support of breastfeeding women

Maternal child health professionals can play a major role in a woman's infant feeding decision and in her success. Women in low-income ethnically diverse populations are especially at risk of not being counseled to breastfeed and not receiving sufficient follow-up.¹⁸⁷ In general, studies in the 1980s and 90s demonstrated that nurses breastfeeding knowledge was low^{25,188, 189}, and health professionals were perceived as providing the least support in the form of encouragement, information, and assistance with breastfeeding techniques.^{190,191} Issues of modeling bottle feeding in the hospitals, including the use of formula discharge packs, affected women's perceptions of health professionals' support of breastfeeding.^{192, 193}

More recent studies indicate that many health professionals serving mothers and infants are inadequately prepared to provide prenatal education, perinatal support and postpartum follow-up for breastfeeding women. Doctors, nurses and other health care providers typically receive little education about lactation during their training.¹⁹⁴⁻¹⁹⁷ A survey of 1137 pediatric fellows indicated the physicians were significantly lacking knowledge in the area of breastfeeding management.¹⁹⁸ An objective rating of lactation

content in 7 pediatric textbooks demonstrated that when breastfeeding information was not omitted, it was often highly variable, inconsistent and inaccurate.¹⁹⁹

Specific to obstetric and pediatric visits, mothers reported minimal discussion of breastfeeding with their practitioners, and few reported discussing specific techniques to maintain lactation while returning to work.⁷¹ Similarly, practitioners (medical doctors, nurse practitioners and nurse midwives) identified limited time during visits as a barrier to breastfeeding promotion.²⁰⁰ Obstetric providers were least confident about managing insufficient milk supply while pediatric providers were not confident in dealing with breast pain and cracked nipples. Pediatric providers tend to recommend supplementation when infants are slow to gain weight.²⁰⁰ The unintentional gaps in information, the neutral attitude, and lack of collaboration with breastfeeding specialists can have a significant effect on the quality of breastfeeding promotion and support provided to women and children.^{71, 200-201}

Research supports the need for health care professionals to continue to examine the breastfeeding-related messages they project to mothers, verbal as well as nonverbal. Promotion and support efforts should include mothers' significant others, including fathers and maternal grandmothers.²⁰²⁻²⁰⁵ Health care professionals need further education on lactation management, especially in the areas of cultural practices, medication use in lactating women, and managing breastfeeding and employment.²⁰⁷⁻²¹⁰ Training of health professionals has been shown in some studies to have an effect on practice and breastfeeding rates.²¹¹⁻²¹⁴ Further research is needed to identify effective methods of education to empower health care providers in their efforts to support their breastfeeding patients through collaboration, leadership and practice.

Breastfeeding practices in developing countries: insights from Africa

Breastfeeding is almost universally practiced in most developing countries. In Africa approximately 99% of mothers breastfeed their infants (Figure 1). Breast milk is typically regarded as the best food for an infant. According to the DHS (Demographic and Health Surveys) comparative studies series 30,²¹⁵ there were no significant differences in the proportion of children ever breastfed when breastfeeding rates were examined by socio-and bio demographic variables. These variables include mothers' education, rural/urban residence, mother's age, birth order, sex of child, birth multiplicity and birth interval. In a study in Botswana in 2002, 95% of the mothers interviewed had breastfed their infants.²¹⁶

Breast Feeding Patterns, Age of Introduction of Complementary Feeding

Although breast-feeding is almost universally practiced among mothers in most parts of the developing world, the predominant pattern is mixed feeding where an infant is given breast milk and other feeds such as water, infant formula, local and commercially prepared cereals, usually from birth. It is believed that newborns require water after food, in the same way that an adult also requires water after a meal. Most mothers supplement their milk with water, teas, or herbal preparations frequently from the first week of life. They do so believing that such fluids will relieve pain (especially colic and earache), prevent and treat common colds and constipation; soothe fretfulness and quench thirst.²¹⁷ Newborns are often given water from the family's normal source to introduce the child to the family's drinking water. Mothers are expected to rest after the "strenuous" process of labor, so glucose water is given to the baby to prevent hunger until lactation begins. It is believed that herbs will make the child "strong," cleanse the baby's stomach, or in other

cases, improve the child's health if the child appears to be ill. It has been shown however that many of these prelacteal feeds are harmful and increase the prevalence of diarrhea and respiratory infection.^{218,219} In rural communities in the savannah area of Nigeria, breastfeeding is widely practiced, but prelacteal feeds are given by all mothers.²²⁰

Breastfeeding Initiation

The association between the time of the first breastfeeding to subsequent breastfeeding establishment has been documented.^{201,202} Earlier initiation of breastfeeding is associated with better breastfeeding outcomes. The range of percentage of infants' breastfed immediately after birth is between 10 (in Mali) to 44 (in Cote d'Ivoire) in West Africa.²¹⁵ Many countries have very low rates of immediate initiation of breastfeeding, though the majority is breastfed within the first 24 hours. Urban-Rural residence, maternal education and age only slightly affect of breastfeeding initiation (Table 2). Among survey respondents in rural southwestern Nigeria, 20% of mothers stated that breastfeeding should commence within 30 minutes of delivery, while about 10% said one or more days after delivery.²²⁷ Three-quarters (76%) of the respondents would not give their newborn colostrum. Colostrum is believed to be bad milk that has stayed in the breast during pregnancy and as such, is harmful to the child and should be discarded. Apart from denying newborns the important benefits of colostrum, discarding it also delays initiation of breast-feeding.

The belief that breast milk alone is not sufficient to meet an infant's nutritional needs also leads to early supplementation. This is in line with child feeding practices in many parts of the world where early supplementation with water and other fluids is a common practice.²⁰⁷⁻²⁰⁸

Demand feeding, expression of breast milk and “wet-nursing”

Breastfeeding on demand is believed to be the normal way of feeding infants. In a survey in Western Nigeria, ²²⁷75% of mothers believed in demand feeding (i.e. a baby should be offered breast milk when he or she needs it, when the baby cries or appears to be hungry). Mothers were aware that some mothers “in the city” gave their infants breast milk based on time intervals, but they thought this was unnatural; and wrong. Mothers in rural areas are more likely to breastfeed on demand. Similar observations have also been made among the Bambaras of Mali. ²⁰⁹

The use of expressed breast milk is not culturally accepted in many parts of Africa. If a mother has to go out, for example to work, it is believed that her child should be fed supplements till she returns. Body fluids (blood, breast milk) and other parts (hair, nails) can be used to divine illness against their owners. Therefore, expressed breast milk can be used to poison, harm, or bewitch a mother or her infant. The milk can also go sour. ²²⁷ When an infant cannot be breastfed by its mother, either as a result of death or illness, the use of a wet-nurse is recommended. This wet-nurse is usually an older woman in the family. She can be the sister of the child’s father, or a co-wife of the mother. The most important thing is that the mother of the child and the wet nurse must have had an amicable relationship, and their “blood can mix well.”²¹⁰

Duration of breastfeeding

The age at which breastfeeding is terminated varies between one to two years. In sub-Saharan Africa, the median duration of breastfeeding, overall, is about 21 months. ¹⁹⁹ Rural children are breast fed 3.2 months longer than urban children. (Table 3) Rural mothers are usually housewives, farmers, or self-employed, and thus have their children

with them most of the time; moreover infant formula may not be readily accessible or affordable. Mothers in the urban areas on the other hand, are more likely to work outside the home leaving their children in day care centers or with housemaids. They may also have more access and money to purchase infant formula and other food supplements.

Breastfeeding is often terminated if the lactating mother becomes pregnant. Pregnant women are not expected to breastfeed as it is believed that the child and the fetus could be harmed. To prevent this, breastfeeding is terminated and the child is washed with an herbal preparation.²¹⁰

Conclusion

In the last 20 years the knowledge base from which lactation consultants can draw from has grown phenomenally. Methods of research have also grown in caliber and sophistication. Knowledge of the physiologic processes of lactogenesis and the maintenance of lactation has progressed significantly, as has the epidemiologic evidence of the benefits of breastfeeding and human milk for the infant and mother. In addition, we have learned about the social, cultural, and personal context surrounding and impacting the complex process of initiation and continuation of breastfeeding. The impact of health care professionals on promoting and supporting breastfeeding has improved, but more is needed in our medical and nursing educational preparation to improve care of the breastfeeding mothers. Methods of treating common problems in breastfeeding mothers have progressed but more research is needed relative to prevention of serious problems such as insufficient milk syndrome and non-exclusive breastfeeding. Breastfeeding among vulnerable populations has increased in general, but more rigorous clinical trials

are needed to promote breastfeeding in women of color, teen mothers, and mothers of very low birth weight infants. As our knowledge of the biological, behavioral and environmental factors that affect breastfeeding continues to grow, lactation consultants will identify additional research problems and areas of needed knowledge. Thus the cycle will continue of describing and explaining problems and ultimately testing interventions to improve practice. It is through this cycle that promotion and support of breastfeeding will continue and likewise improve breastfeeding initiation and duration worldwide.

Table 1.

Function	Key Constituents
Anti-microbial	Oligosaccharides, lactoferrin, fatty acids, lysozyme, immunoglobulins, bifidus factor, complement, mucins, lactoperoxidase
Anti-inflammatory	Cytokines, Long-chain polyunsaturated fatty acids, growth factors, lactoferrin, hormones
Immune system promotion/development	Macrophages, cytokines, lymphocytes, long-chain polyunsaturated fatty acids, nucleotides, growth factors, hormones, neutrophils

Table 2: Regional Summary of Timing of Initial Breastfeeding

Region	Timing of initial breastfeeding after birth				
	First hour	1-23 hours	2 nd day	After 2days	Total
Sub-Saharan Africa	32.5	31.9	14.3	21.3	100.0
Near East/North Africa	35.6	40.5	9.7	14.2	100.0
Asia	15.0	31.6	16.5	36.9	100.0
Latin America/Caribbean	36.6	29.1	13.2	21.2	100.0

Source: demographic and Health surveys, 1990-96¹

Table 3 Regional summary of median duration of breastfeeding (in months), by urban-rural residence

Region	Residence		
	Total	Urban	Rural
Sub-Saharan Africa	21.0	18.4	21.6
Near East/ North Africa	14.8	13.3	15.3
Asia	21.3	18.9	22.0
Latin America/Caribbean	13.9	12.7	15.0

Source: demographic and Health surveys, 1990-96¹

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