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Breast feeding practices: Effect on infant morbidity

Vinutha U Muktamath and Sunanda Itagi

Abstract

WHO recommends mothers worldwide to exclusively breastfeed infants for the child's first six months to achieve optimal growth, development and health. Breast milk comes equipped with antibodies that a woman generates and passes on to her infant. Babies have immature immune systems, less stomach acid to destroy foreign substances and unsanitary eating habits, so these antibodies improve their chances of survival. If every child was breastfed within an hour of birth, given only breast milk for their first six months of life, and continued breastfeeding up to the age of two years, about 800,000 child lives would be saved every year. In view of this, a differential design on "Breast Feeding Practices: Effect on Infant Morbidity" was conducted in the year 2015-16 with the objective to assess the effect of breast feeding practices on infant morbidity. The population of the study consisted of 900 mother –infant dyads, where the infants were in the age group of 3months to 24 months and their mothers from rural as well as urban area of northern Karnataka. The tools used for the study were Socio – economic status scale developed by Aggarwal *et al.* (2005) ^[1] and a self structured questionnaire to document the feeding practices, patterns, maternal and child health indicators, knowledge and attitude of mothers towards breast feeding. Most (51.78%) of the mothers reported that the children were suffering illness as against no illness (48.22%). Regarding the type of illness the type of illness recorded the most was cold and upper respiratory tract infections (40.44%), followed by diarrhoea (17.56%), colic pain (8.22%), sinus problems (5.56%), constipation (5.44%), ear infections (5.33%), Pneumonia and lung infections (4.11%), urinary tract infections (2.67%) and heart and Kidney problems (0.33%). It was observed that majority of the exclusively breast fed infants for first six months did not report any illness (75.26 vs 24.74%), followed by predominantly breast fed infants (38.34 Vs 61.76%), complementarily fed infants (15 vs 85%) and never breast fed infants (7.10 Vs 92.86%) indicating higher odd of illness in children who are breast fed for less than three months.

Keywords: Breastfeeding, morbidity, health indicators, illness

Introduction

Breastfeeding is an unequalled way of providing ideal food for the healthy growth and development of infants; it is also an integral part of the reproductive process with important implications for the health of mothers. Colostrum, the yellowish, sticky breast milk produced at the end of pregnancy, is recommended by WHO as the perfect food for the newborn and feeding should be initiated within the first hour after birth.

Scientific evidence has acknowledged breastfeeding as a gold standard for the infant's survival, health and development. It is believed to be the best start of infant life because of its nutritional, immunological and psychological benefits (Elizabeth, 2015) ^[16]. WHO recommends mothers worldwide to exclusively breastfeed infants for the child's first six months with continued breastfeeding along with appropriate complementary foods up to two years of age or beyond to achieve optimal growth, development and health. WHO fact files, 2015 reports that 44 per cent under five deaths occur in first 28 days of life. The infant mortality rate in India is 41/1000 live births and 28/1000 live births in Karnataka according to NFHS-4 report released in 2015-16.

According to the NFHS-4 report the exclusive breastfeeding rates in India are 54.90 per cent and in Karnataka is 54.20 per cent (Anon., 2014) ^[2]. Improvements in breastfeeding rates are critical to the attainment of the Millennium Development Goals and Post-2015 Sustainable Development Goals, especially to achieve the millennium development goals of reducing child mortality and improving maternal health (Parveen *et al.*, 2012 and Ahmed *et al.*, 2014) ^[26, 19]. Adequate breastfeeding counselling and support are essential for mothers and families to initiate and maintain optimal breastfeeding practices.

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Breastfeeding and infant morbidity, mortality and other health outcomes

Breast milk comes equipped with antibodies that a woman generates and passes on to her infant. Babies have immature immune systems, less stomach acid to destroy foreign substances and unsanitary eating habits, so these antibodies improve their chances of survival. One such antibody works against rotavirus, the most common cause of diarrhoea in infants. Now, researchers in the United States and Mexico have discovered that complex carbohydrate in breast milk affords babies even more protection than the antibody specifically made to fight against fatal diseases like diarrhoea, viral infections and other diseases.

Globally, there is consistent and substantial evidence that early, exclusive and continued breastfeeding through 23 months significantly reduces neonatal and child mortality. A technical brief on the impact of early initiation of breastfeeding on newborn deaths (Oot *et al.*, 2015) [25] estimated that initiation of breastfeeding within the first hour of birth could prevent 20 per cent of neonatal deaths and reduces the risk of infection related neonatal mortality by 45 per cent. The epidemiological evidence shows that, if every child was breastfed within an hour of birth, given only breast milk for their first six months of life and continued breastfeeding up to the age of two years, about 8,00,000 child lives would be saved every year (Victoria *et al.*, 2016). The Lancet Nutrition Series, 2016 (Victoria *et al.*, 2016) also reinforced the significance of optimal IYCF (Infant and Young Child Feeding) on child survival. Optimal IYCF, especially exclusive breastfeeding, was estimated to prevent potentially 1.4 million deaths every year among children under five (out of the approximately 10 million annual deaths). According to the nutrition series, over one third of under-five mortality is caused by under nutrition, in which poor breastfeeding practices and inadequate complementary feeding play a major role. The extant literature concerning the association between breastfeeding and long-term child health and wellbeing suggest that breastfed children are significantly less likely than their bottle-fed counterparts to be classified as obese, develop asthma and be diagnosed with autoimmune diseases, such as Type I diabetes and childhood cancers (Colen and Ramey, 2014) [12]. Breastfeeding is a life-and death issue in developing countries; recent meta-analysis reports that breastfeeding markedly reduced mortality (especially mortality due to infectious disease) with breastfeeding, even into the second year of life. The epidemiologic evidence is now overwhelming that, even in developed countries, breastfeeding protects against gastrointestinal and (to a lesser degree) respiratory infection and that the protective effect is enhanced with greater duration and exclusivity of breastfeeding (Kramer *et al.*, 2003) [20].

Lee *et al.* (2012) [22] evaluated premature infants in eleven NICUs in California where multiple interventions were implemented. The results revealed that breast milk feeding rate in the intervention sites improved from baseline (54.60%) to intervention period (61.70%) with sustained improvement over 6 months post intervention (64%). NEC (necrotizing enter colitis) rates decreased from baseline (7%) to intervention period (4.30%) to sustainability period (2.40%) of an 18-month period.

Oddy *et al.* (2012) [23] found that duration of breastfeeding (less than six months) compared with a longer duration (\geq six months) was associated with increased mental health morbidity from early childhood to adolescence. Children breastfed for six months or longer had significantly lower mean behavioural scores (meaning improved behaviour) across total, internalizing and externalizing domains of mental health morbidity.

Eidelman and Schanler (2012) [15] in the policy statement of breastfeeding and the use of human milk of American Academy of Pediatrics (AAP) reported that the risk of hospitalization for lower respiratory tract infections in the first year was reduced by 72 per cent, if infants were breastfed exclusively for more than 4 months, the risk of pneumonia was four fold in infants exclusively breastfed for 4 to 6 months compared with infants who exclusively breastfed for more than 6 months. Any breastfeeding compared with exclusive commercial infant formula feeding reduced the incidence of otitis media by 23 per cent and 50 per cent if exclusively breast fed more than 3 months. Serious colds and ear and throat infections were reduced by 63 per cent in infants, 64 per cent reduction in the incidence of nonspecific gastrointestinal tract infections and 7 per cent reduction in NEC (necrotizing enterocolitis), 36 per cent reduced risk of SIDS (sudden infant death syndrome) in exclusively breast fed infants. Reduction of 52 per cent in the risk of developing celiac disease in infants, 15 to 30 per cent in adolescent and adult obesity rates, 30 per cent in the incidence of type 1 diabetes mellitus, 20 per cent in the risk of acute lymphocytic leukemia and 15 per cent in the risk of acute myeloid leukemia in infants breastfed for 6 months or longer was observed.

In this context, the present study was conducted with the following objectives.

1. To study the breastfeeding practices in northern Karnataka
2. To examine the association between duration of exclusive breastfeeding /weaning and infant morbidity
3. To compare the prevalence of illness among breastfed and non-breast fed infants
4. To develop intervention package on breastfeeding practices

Material and Methods

Sample

The target population of the study was mother–infant dyads. The sample of the study consisted of 900 Mother –infant dyads, where the infants were in the age group of 3 months to 24 months and their mothers from rural as well as urban area of northern Karnataka in the year 2016.

Tools Used for data Collection

The tools used for the study included a self- structured questionnaire, socio-economic status scale (Aggarwal *et al.*, 2005) [1] and Iowa infant feeding attitude scale (de la Mora *et al.*, 1999) [13].

Research Design

A differential design was used to compare the differences in breast feeding practices, knowledge and attitude among urban and rural mothers and to compare the effect of breastfeeding practices on infant morbidity.

The study was approved by ethical committee of University of Agricultural Sciences, Dharwad.

Results and Discussion

Table 1: Familial characteristics of the sample selected for the study (N=900)

Category	N (%)
1. Locality	
Rural	600 (66.67)
Urban	300 (33.33)
2. Religion	
Hindu	784 (87.11)
Muslim	107 (11.89)
Christian	3 (0.33)
Jain	5 (0.56)
3. Caste	
Lingayat /brahmin (forward)	379 (42.11)
Scheduled caste	139 (15.44)
Scheduled tribe	77 (8.56)
Other backward caste	305 (33.89)
4. Family Type	
Nuclear	466 (51.78)
Joint	434 (48.22)
5. SES of the family	
Upper High	25 (2.78)
High	89 (9.89)
Upper middle	308 (34.22)
Lower middle	372 (41.33)
Poor	106 (11.78)

Figures in parenthesis indicate percentages

The familial characteristics of sample (mother-child dyad) selected for study is presented in the Table 1. It is apparent from the table that 66.67 per cent were from rural area and 33.33 per cent from urban area. With regard to religion, majority of the subjects were Hindus (87.11%). With respect to caste, most of the subjects' belonged to forward caste (42.11%), followed by other backward caste (33.89%), 15.44 per cent were from schedule caste and 8.56 per cent were from schedule tribe. Regarding family type, 51.78 per cent respondents were from nuclear family and 48.22 per cent were from joint family. With regard to family size, almost equal percentage of subjects belonged to small (44.22%) and medium (41.60%) size family, followed by large family (14.20%). With regard to Socio economic status of the family, most of the subjects belonged to lower middle (41.33%) and upper middle (34.22%), followed by poor (11.78%), high (9.89%) and upper high (2.78%). None of the subjects belonged to below poverty line category.

Table 2: Characteristics of the child (N=900)

Category	N (%)
1. Gender of the child	
Male	469 (52.11)
Female	431 (47.89)
2. Age of the child (Months)	
0-6	127 (14.11)
6-12	275 (30.56)
12-24	498 (55.33)
3. Birth weight of the child (g)	
> 2,500 (normal)	794 (88.22)
< 2,500-1,500 (LBW)*	100 (11.11)
< 1,500-1,000 (VLBW)**	6 (0.67)
< 1,000 (ELBW)***	NIL
4. Birth order of the child	
First born	375 (41.66)
Second born	358 (39.78)
Third and above	167 (18.56)

Figures in parenthesis indicate percentages, * Low birth weight, ** Very low birth weight, *** Extremely low birth weight

The characteristics of the child represented in Table 2 shows that 52.11 per cent were male children and 47.89 per cent were females. The age group ranged from 0 to 24 months. Majority of the children were in the age group of 12-24 months (55.33%), followed by 6-12 months (30.56%) and 0-6 months (14.11%). Regarding birth order, 41.66 per cent were first born, 39.78 per cent were second born and 18.56 per cent were third born or above. With respect to birth weight majority were in the normal category (88.22%), followed by low birth weight infants (11.11%) and 0.67 per cent were very low birth weight children.

Table 3: Breast feeding initiation and colostrum feeding (N=900)

Category	N (%)
1. Breast feeding initiation	
Immediately	444 (49.33)
< 1 hr	74 (8.22)
1 hr-6hrs	76 (8.44)
7 hrs-24hrs	29 (3.22)
>24hrs-3 days	51 (5.67)
>3 days	226 (25.11)
2. Reasons for delay in initiation*	
Mother's illness	41 (4.56)
No Milk production	85 (9.44)
Baby was in NICU/ ILL	78 (26.00)
Cultural belief	54 (6.00)
Low birth weight/weak baby	35 (3.89)
Mother unable to feed due to labour stress	137 (15.22)
Post partum depression	08 (0.89)
3. Colostrum feeding	
Fed	657 (73.00)
Not Fed	243 (27.00)
4. Reasons for not feeding Colostrum*	
Cultural belief	85 (9.44)
Impure Milk	36 (4.00)
Affects the health of newborn	19 (2.11)
No/Sufficient milk secretion	110 (12.22)
Mother not able to feed due to illness	38 (4.22)
Low birth weight baby	27 (3.00)
Premature baby	50 (5.56)
Illness of the baby	240 (26.67)

Figures in parenthesis indicate percentages *-Multiple responses

A close perusal of Table 3 shows the practices in breast feeding initiation and colostrum feeding. Most of the mothers initiated breast feeding immediately (49.33%), within 1 hour (8.22%), 1- 6 hours (8.44%), 7-24 hours (3.22%), > 24 hours-3 days (5.67%) and 25.11 per cent initiated breast feeding after 3days.

With regard to reasons for delay in breast feeding, the common reasons expressed by mothers were Mother's illness, no milk production, baby was in NICU/ill, cultural belief, low birth weight or weak baby, mother unable to feed due to labour stress, post partum depression. The reasons quoted the most were baby was in NICU/ill (26%) and mother unable to feed due to labour stress (15.22%).

With respect to colostrum feeding majority of mothers (73%) fed colostrum, while 27 per cent of mothers did not feed colostrum. The most common reasons for not feeding colostrum was cultural belief (9.44%), impure milk (4%), affects the health of new born (2.11%), no/insufficient milk secretion (12.22%), mother not able to feed due to illness (4.22%), low birth weight baby (3%), premature baby (5.56%) and illness of the baby (26.67%).

The rate of colostrum feeding was high in Bagalkot district (85.33%), followed by Dharwad (71.67%) and it was lowest in Vijayapura district (62%).

Table 4: Prevalence and practices of prelacteal feeding (N=900)

Category	N (%)
1. Prelacteal feeding	
Fed	520 (57.78)
Not fed	380 (42.22)
2. Prelacteal feeds given*	
Water	145 (16.11)
Sugar water	98 (10.89)
Jaggery	19 (2.11)
Honey	73 (8.11)
Gutti	157 (17.44)
Cow's milk	37 (4.11)
Formula	148 (16.44)
Glucose water	82 (9.11)
Gripe water	101 (11.22)

Table 4 indicates the prevalence and practices of prelacteal feeding. Majority (57.78%) of mothers fed prelacteal feeds, while 42.22 per cent mothers did not give any prelacteal feeds to the baby. The common prelacteal feeds given were gutti (17.44%), followed by formula (16.44%), water (16.11%), gripe water (11.22%), sugar water (10.89%), glucose water (9.11%), honey (8.11%), cow's milk (4.11%) and jaggery (2.11%).

Table 5: Breast feeding practices in mothers

Category	N (%)
1. Duration of each feeding	
< 10 mins	182 (20.22)
> 10 mins	62 (6.89)
Till the baby sleeps	306 (34.00)
Leaves on its own	350 (38.89)
2. Frequency of breast feeding	
On demand	619 (68.78)
At regular Intervals	
a) 1-2 hrs	214 (23.78)
b) 2-3 hrs	67 (7.44)
5. Total duration of breast feeding (months)	
< 3	16 (1.78)
3-6	33 (3.67)
6-12	67 (7.44)
12-24	119 (13.22)
> 24	19 (2.11)
Still Feeding (< 24 months)	646 (71.78)
Range	0-25
Mean \pm SD	12.75 \pm 6.29

Figures in parenthesis indicate percentages

The breast feeding practices in mothers are shown in the Table 2.3. It is apparent from the table that most of the mothers breast fed till the baby left on its own (38.89%) or till the baby sleeps (34%), followed by feeding less than 10 minutes (20.22%) and more than 10minutes (6.89%).With

Table 8: Association between child illness and breast feeding practices (N=900)

Breast feeding category	Illness N (%)		Total N (%)	Mean \pm SD	F-value	CD \pm S.Em.
	Yes	No				
Exclusive breast feeding for first six months	94 (24.74)	286 (75.26)	380 (100.00)	1.07 ^{ab} \pm 0.267	97.431**	0.004 \pm 0.0002
Predominantly breast for first six months	189 (61.76)	117 (38.24)	306 (100.00)	1.15 ^{ba} \pm 0.238		
Complementarily breast Feeding	170 (85.00)	30 (15.00)	200 (100.00)	1.32 ^c \pm 0.237		
Bottle fed/not fed with breast milk	13 (92.86)	1 (7.10)	14 (100.00)	1.75 ^d \pm 0.432		
Total	466 (51.78)	434 (48.22)	900 (100.00)			

regard to frequency of breast feeding, majority breast fed on demand (68.78%), followed by regular intervals, *i.e.*, 1-2 hours (23.78%) and 2-3 hours (7.44%). With respect to total duration of breastfeeding majority of mothers were still feeding (71.78%), followed by breast feeding from 12-24 months (13.22%), 6-12 months (7.44%), 3-6 months (3.67%), more than 24 months (2.11%) and less than 3 months (1.78%).

Table 6: Distribution of infants based on category of breast feeding according to world health organisation (WHO)

Category of breast feeding (WHO classification)	N (%)
Exclusively breast fed for first six months	380 (42.22)
Predominantly breast fed for first six months	306 (34.00)
Complementarily breast fed for first six months	200 (22.22)
Bottle fed/never fed with breast milk	14 (1.56)
Total	900 (100.00)

Figures in parenthesis indicate percentages

Table 6 distribution of infants based on category of infant feeding practices and results indicate that 42.22 per cent infants were exclusively breast fed for first six months, 34 per cent were predominantly breast fed, 22.22 per cent were complementarily breast fed for first six months and 1.56 per cent was never fed with breast milk.

Table 7: Prevalence and type of illness among the children

Category	N (%)
1. Prevalence in previous three months	
Yes	466 (51.78)
No	434 (48.22)
Total	900 (100.00)
2. Type of illness*	
Ear infections	48 (5.33)
Cold and upper respiratory infections	364 (40.44)
Diarrhoea	158 (17.56)
Colic pain	74 (8.22)
Sinus problems	50 (5.56)
Pneumonia or lung infections	37 (4.11)
Urinary tract infections	24 (2.67)
Constipation	49 (5.44)
Heart and kidney problems	3 (0.33)

* Multiple responses

Table 7 shows that most (51.78%) of the mothers reported that the children were suffering illness as against no illness (48.22%). The prevalence of illness among children was highest in Vijayapura (60.33%), followed by Bagalkot (49%) and Dharwad (46%).

Regarding the type of illness the type of illness recorded the most was cold and upper respiratory tract infections (40.44%), followed by diarrhoea (17.56%), colic pain (8.22%), sinus problems (5.56%), constipation (5.44%), ear infections (5.33%), Pneumonia and lung infections (4.11%), urinary tract infections (2.67%) and heart and kidney problems (0.33%).

Chi-Square	22.142**			
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** - Significant at 1% level

Table 8 that majority of the exclusively breastfed infants for first six months did not report any illness (75.26 vs 24.74%), followed by predominantly breastfed infants (38.34 vs 61.76%), complementarily fed infants (15 vs 85%) and never breastfed infants (7.10 vs 92.86%). A significant difference with respect to illness between infants in different breast feeding categories was observed (ANOVA). The post hoc (LSD) shows that there was no significant difference among

exclusively and predominantly breast fed infants with respect to illness. Whereas, complementarily breast fed and never breastfed infants significantly differed from both exclusively and predominantly breastfed infants. χ^2 value indicated a strong association between illness among infants and breast-feeding practices.

Table 9: Bivariate analyses showing association between child illness and breastfeeding duration

Duration of breast feeding	Illness in the child				OR (95% CI)	P-value
	Yes	%	No	%		
< 3 months	54	40.60	79	59.40	1.00	0.000***
3-6 months	112	42.42	152	57.58	0.320 (0.144,0.709)	
6-12 months	169	47.60	186	52.40	0.457 (0.272,0.765)	
12-24 months	37	28.68	92	71.32	0.587 (0.404,0.851)	
> 24 months	08	42.11	11	57.89	0.900 (0.366,2.215)	

*** - Significant at 1% level

Table 9 indicates that children breast fed for longer duration had lower odds of illness *i.e.*, 3-6 months (OR = 0.320, 95% CI = 0.144, 0.709), 6-12 months (OR = 0.457, 95% CI = 0.272, 0.765), followed by 12-24 months (OR = 0.587, 95% CI = 0.404,0.851) and more than 24 months (OR = 0.900, 95% CI = 0.366, 0. 2.215) with breast feeding duration less than 3 months as reference category.

Similar results were found by Kuzma (2013) [21], Raghavan *et al.* (2012) [27] and Subbaiah and Jegannathan (2012) who observed that 98 per cent of the mothers were breastfeeding their babies when they cried, which amounted to 7–8 times per day. Joshi *et al.* (2014) [12] revealed that the prevalence of EBF in Mirzapur (36%) was lower than the national figure (64%). Parveen *et al.* (2012) [26] also found that, majority of mothers (62.30%) did not practice exclusive breast feeding. Onah *et al.* (2014) [24] noted that the practice of EBF (33.50%) was very low in Nnewi, south-east Nigeria. EBF practice decreased with increasing infant age and low maternal education, high socioeconomic class, mode of delivery (caesarean) and infants first feed were important maternal predictors of EBF practice.

The results were found to be consistent with Hanieh *et al.* (2015) [11] where in exclusive breast feeding at 6 weeks of age significantly reduced the odds of inpatient admission for suspected pneumonia and diarrhoeal illness. Chandhiok *et al.* (2015) [10] indicated that hazard ratio (HR) of infant death observed in NFHS-3 (2005-2006) was 18 percent less (HR = 0.82) as compared to that observed in NFHS-1 (1992-1993). After adjustment of other factors, the risk of infant death was 97 per cent less amongst children who were breastfed (HR= 0.03) as compared to those who were not breast fed. Hajebehoy *et al.* (2014) [17] also revealed that early initiation of breastfeeding was associated with lower prevalence of diarrhoea, while prelacteal feeding was associated with higher prevalence. Compared to infants who were exclusively breastfed, infants who were predominantly or partially breastfed were more likely to have diarrhoea and acute respiratory infections.

A similar result was observed by Abram *et al.* (2014) where in mortality (2 v/s 8%) and NEC (5 v/s 17%) differed significantly between the human milk and cow's milk groups. For every 10 per cent increase in the volume of milk

containing cow's milk the risk of sepsis increased by 17.90 per cent.

It can be concluded that exclusive breast feeding upto first six months and breast feeding for 12 months and more significantly reduces the morbidity rate in infant, specially reducing the incidence of acute respiratory infections, diarrhoea and pneumonia which in turn reduces the risk of infant mortality rates in infants less than two years.

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