

Breastfeeding Practices and Nutritional Status of Children Aged One to Five Years in Jaffna District, Sri Lanka

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Abstract

Breastfeeding is essential to break the vicious cycle of under nutrition of children. This study was aimed to assess the breastfeeding practices and nutritional status of children aged one to five years in Jaffna district. The study design was descriptive cross sectional. Height, weight, haemoglobin, albumin and serum ferritin of children were measured. Structured interviewer administered questionnaire was used to obtain socio-demographic factors, breastfeeding practices and dietary pattern. Among the total of 846 children (414 boys), 64.4% (545) were exclusively breastfed for 6 months. Among 585 children who were breastfed, 55.6% were breastfed beyond two years while 12.6% were breastfed beyond three years. Working mothers (13.7%) had discontinued the exclusive breastfeeding (EBF) before the completion of six months (45.7%) when compared with the non-working mothers (67.4%). The prevalence of underweight, wasting and stunting was 33, 22 and 26% respectively. Prevalence of under nutrition was significantly high (54.2%) in non-EBF children. Prevalence of anaemia was high among non-EBF children (45.8%). Furthermore the early cessation of EBF before six months depended on the type of family (nucleated or extended) and wealth class of the households ($p < 0.05$). The rate of EBF was low in Jaffna District and duration of breastfeeding of most of the children had not reached 2 yrs. Prevalence of under nutrition was significantly high among the non-exclusively breastfed children. EBF for six months was not practised due to several factors and have contributed to high prevalence of malnutrition in Jaffna district.

Keywords: *Exclusive breastfeeding (EBF), anthropometric measurements, feeding, under nutrition, complementary feeding, anaemia*

Introduction

Incorrect breastfeeding practices are linked with malnutrition in children¹⁻³. Further it has been observed that, non-breastfed children

are more likely to suffer from infectious diseases such as diarrhoea and respiratory tract infections and those diseases further aggravate the undernutrition in children⁴. In addition,

breast milk is free of contaminants and has immunoglobulin A, macrophages and antioxidants, which protect the baby from diseases⁵. Thus the breastfeeding determines the optimal development of physical and mental capacity, immunity and correct feeding habits, and prevent the adverse consequences of nutrition and health status of children⁶. Period up to 2 yrs of children is a “critical window” for the maintenance of health, optimal growth and development of children⁷. As a result, WHO has recommended that, the exclusive breastfeeding should be continued for the first six months and breastfeeding for more than 2 yrs⁸. However, young children are at higher risk of under nutrition after six months of age, as breast milk alone is no longer adequate to encounter all nutritional requirements and complementary feeding needs to be started. WHO defines exclusive breastfeeding as feeding only breast milk to infants up to six months, excluding solids or other fluids (including infant formula) except prescribed medicines and micronutrients such as minerals and vitamins⁹.

In rural Bangladesh the prevalence of EBF was 36%¹⁰ and in Tamil Nadu, India it was 34%¹¹ whereas, in Sri Lanka, 75.8% of children up to 5 months had exclusive breastfeeding¹². In this survey, the Northern Province was excluded due to the situation prevailed at that time.

Though the breastfeeding rate is reported to be high in Sri Lanka when compared with other South Asian countries, no breastfeeding indicators is available to report the breastfeeding practices and nutritional status of children in Jaffna district. In this study, infants were excluded due to the collection of blood samples and the majority of the mothers did not give the consent to draw the blood from their child. Thus 1 to 5 yr old children were included in this study with the objective of assessing the breastfeeding practices and nutritional status of children in Jaffna district, Sri Lanka.

Materials and Methods

Selection of subjects

In a descriptive cross sectional study design, 846 children were selected with the multistage clustering approach. The study was carried out from 2012 to 2014. Children with chronic illness were excluded. The study instrument was a pre tested interviewer administered proforma and was used to get the information on nutritional status and associated factors such as socio-demographic and economic factors and feeding practices.

Widely used method of assessing the rate of exclusive breastfeeding is the method of ‘recall since birth’, in which a child is considered as exclusively breastfed only if they have not received any food or drink other than breast milk since birth¹³. This method needs a

lengthier recall period, but firmly emphasizes the infant feeding definitions since birth given by WHO.

Feeding the child with breast milk only, without giving any solids (not even water) for a particular period since birth were obtained to get the EBF rate. However administering medicines, micronutrients (vitamins and minerals) and oral rehydration solution were allowed⁹. Mothers were questioned about the breastfeeding practices such as exclusive or non-exclusive since birth to their infants. Under this, duration of the EBF and breastfeeding were specifically questioned. Then, the mothers were permitted to discuss about, how they fed their children and some detailed and specific questions were discussed with mothers to verify the validity of the information and to support the mother to recall the information regarding breastfeeding and complementary feeding. The third dose of Diphtheria-Pertussis -Tetanus (DPT) and oral polio vaccine is administered at 6 months in Sri Lanka, hence the mother was questioned whether she exclusively breastfed her child by the time of the third dose of these vaccines. Period of breastfeeding was recorded as the age in complete months. If any mother was on breast feeding her child at the date of data collection, those details were recorded separately. Details of complementary feeding practices and dietary pattern

were obtained from mothers. Researcher made several ways to minimize the recall bias. Pilot study was performed to pre-test the questionnaire among a few mothers in the same area and they were not included in the study.

Educational levels of parents, type of family (nucleated or extended family), employment status of mothers, income and household assets were obtained from the mothers. Educational levels of the mothers were categorized as no schooling, primary education (grade one to five), secondary education (grade six to G.C.E. and Advance level) and tertiary education (diploma, graduate and post graduate). Household assets were used to construct the wealth index. Wealth index was categorized in to poor, second, middle, fourth and rich.

Assessment of nutritional status

Age, sex and birth weight of the child were derived from the Child Health Development Records (CHDR) of the child. The selected children were weighed with light cloth by using an electronic weighing scale (SECA 811) with accuracy of ± 100 g. The height of the children was measured with a portable stadiometer (SECA 213) with accuracy of ± 0.5 cm. The anthropometric measurements of the children (weight and height) were used to obtain age and sex specific z-score values for weight-for-age (WAZ), weight-for-height (WHZ),

and height-for-age (HAZ) using WHO Anthro software (version 3, 2009) to detect underweight, wasting and stunting which were defined as WAZ, WHZ and HAZ less than -2 SD below the WHO growth standards, respectively and its severe forms were defined as the z-score value less than -3SD.

Statistical analysis

IBM-SPSS Statistics for Windows, Version 21.0 (Armonk, NY: IBM Corp.) package was used for statistical analyses. Analysed data are presented as mean \pm standard deviation (SD), mode, median and percentages. Comparison of two means was done using Student's t-test. The chi-square test was used to compare the categorical variables. P-value less than 0.05 was considered as significant.

Ethics

Ethical clearance was obtained from Ethics Review Committee, Faculty of Medicine, University of Jaffna, Sri Lanka and all procedures followed were in accordance with the ethical standards. Informed written consent was obtained from mother to allow her child in the study.

Results and Discussion

Baseline characteristics

Out of 856 selected children, 846 responded (response rate = 98.8%). The mean age of the children was 35 (\pm 13) months and ranged between 12 to

59 months. There were 414 males (48.9%) and 432 females (51.1%). Higher number of children from rural area was observed [641 (75.8%)] (Table I).

Exclusive breastfeeding

The mean (\pm SD) duration of EBF were 5.2 (\pm 1.6) with a median of 5 months. In this study, 63.9% of the children was exclusively breastfed until the completion of 6 months as per the WHO recommendation, 0.5% continued EBF beyond 6 months, of the 301 children who were not exclusively breast fed, 2.6% were never exclusively breastfed (formula milk was introduced at initial period) and 30.3% were breastfed, but not exclusively breast fed until the completion of 6 months.

This study revealed that, 0.4% of mothers had no schooling and they have stopped EBF at the mean of 3.5 months. Of the mothers 9.8, 85.4 and 4.5% had primary, secondary and tertiary educational level respectively and they have stopped EBF at the mean of 4.2, 5.8 and 5.4 months respectively [Spearman's correlation coefficient (0.781) was significant at the 0.05 level]. Mothers who were working (13.7%) had discontinued the exclusive breastfeeding before the completion of six months (45.7%) when compared to non-working mothers (67.4%). Further, it was observed that 18% of the mothers in Jaffna District were unaware of the duration of exclusive breastfeeding as 6 months.

TABLE I
Distribution of the Participants Based on
Socio-Demographic Factors

	No.	%
Gender		
Male	414	48.9
Female	432	51.1
Age (months)^a		
12-23	209	24.7
24-35	239	28.3
36-47	221	26.1
48-59	177	20.9
Sector		
Urban	205	24.2
Rural	641	75.8
Type of family		
Nucleated Family	500	59.1
Extended Family	346	40.9
Total Household members		
3	66	7.8
4	168	19.9
5	238	28.1
6	182	21.5
7	131	15.5
>7	61	7.2
Total income (Rs^b/Month)		
<10000	26	3.1
10000-19999	395	46.7
20000-29999	211	24.9
30000-39999	89	10.5
>40000	125	14.8
Educational level of the father		
No Education	17	2.0
Primary Education	95	11.2
Secondary Education	656	77.5
Tertiary education	78	9.2
Educational level of the mother		
No Education	4	0.5
Primary Education	78	9.2
Secondary Education	722	85.3
Tertiary education	42	5.0
Wealth Index^c		
Poor class	44	5.2
Second class	215	25.4
Middle class	488	57.7
Fourth class	99	11.7

^aAge was defined in completed months by the date of data collection and date of birth was obtained from child health development record (CHDR).

^bIncome is based on the Sri Lankan Rupee (Rs).

^cHousehold assets were used to obtain the wealth index based on Principal Component Analysis.

Rate of EBF (68.8%) was significantly higher among the children from extended families (346) than that of children from nucleated families (61.4%) ($p < 0.05$). Only 13.6% of the mothers from the fourth wealth class exclusively breastfed to their infants while 61.3% of the mothers from middle class exclusively breastfed. It was observed that, the early introduction of expensive infant formula within the 6 month period from the birth was practised by mothers from higher wealth classes.

This exhibits that, early cessation of exclusive breastfeeding before six months depends on the educational level of mothers, employment status of mothers and type of family and wealth class of the households in this study.

Breastfeeding duration

Mean (\pm SD) breastfeeding duration was 22.4 (\pm 8.48) months. Among the mothers, 261 (30.8%) had been continuing breastfeeding at the time of data collection. Among the 585 mothers who have stopped breastfeeding, 325 (55.6%) were breastfed beyond two years while 74 (12.6%) of children were breastfed beyond 3 yrs. Considerable number of mothers stopped breastfeeding to their children 44 (7.5%) within one year. Of a total of 261 children who were on breastfeeding, 78 (29.9%) were breastfed beyond two

years while 62.5% were on breastfeeding within the period between 1-2 yrs. Duration of breastfeeding was not satisfied in this population. Based on WHO recommendations, only 56.4% had been breastfeeding beyond 2 yrs.

Complementary feeding practices

In this study, the mean initiation month of cooked rice was 6.98 and 5.51 months for male and female children respectively ($p < 0.05$). Mean introduction of water, semi solids and infant formula milk powder was 5.9, 8.8 and 6 months respectively. In this study, 36.1 % of the mothers have introduced the complementary feeding before the completion of 6 months. Less than 50% of the mothers have introduced the complementary feeding at 7 months. More than 50% of the mothers introduced the meat after 12 months of the age, while, 49.7% of the mothers had introduced the commercial starter infant formula before 7 months. In this study, 97.9 % of the mothers have introduced egg after 9 months.

Nutritional status of children

Among the children 21.6, 33.1, 26.4 and 3.4% were affected with wasting, underweight, stunting and overweight respectively. Prevalence of malnutrition was significantly higher among non-EBF children (54.2%) when compared with the exclusively breastfed children (21.7%) [Odds Ratio =4.3 (3.2-5.9)] (Table II).

Among the children who completed the breastfeeding (570) at the time of data collection, the prevalence of under nutrition was high (26.1% of wasting; 42.9% of underweight; 36.1% of stunting) among those who have stopped breastfeeding within 2 yrs than that of the children who have been breastfed beyond 2 yrs from birth (21.2% of wasting; 33.7% of underweight; 27.1% of stunting). The exclusive breastfeeding was associated with weight gain of the children, especially who were low birth weight infants and it was significant (multinomial logistic regression model was significant at $p=0.049$).

TABLE II
Prevalence of Malnutrition in Children with Exclusive Breastfeeding

Nutritional status	No. of EBF children (%)	No. of Non EBF children (%)	O R ¹ (CI)	P-value
Wasting	78 (14.3)	109 (36.2)	3.5 (2.5-4.9)	0.001
Underweight	118 (21.7)	164 (54.2)	4.3 (3.2-5.9)	0.001
Stunting	117 (21.5)	106 (32.2)	2.0 (1.4-2.7)	0.001
Overweight	23 (4.2)	02 (0.7)	0.1 (0.03-0.6)	0.014

¹ORs for Non-EBF group considering EBF as the reference.

TABLE III
Biochemical Parameters of Children of Exclusively Breastfed and Non-Exclusively Breastfed Children

	No. of EBF children (%)	No. of Non EBF children (%)	O R ¹ (CI)	P-value
Protein deficiency	107 (19.6)	123 (40.9)	2.8 (2.0-3.8)	0.001
Anaemia	170 (31.3)	138 (45.8)	1.8 (1.3-2.5)	0.001
Iron deficiency	161 (29.9)	130 (43.8)	1.8 (1.3-2.4)	0.001
Iodine deficiency	93 (17.1)	58 (19.3)	1.1 (0.8-1.7)	0.453

Protein deficiency, anaemia, iron deficiency, and iodine deficiency were based on <3.5g/dL of serum albumin, <11g/dL of haemoglobin, <12ng/mL of serum ferritin, and <100mg/L of Urinary iodine concentration respectively.

Prevalence of anaemia was 36.41 %. Of this study, 34.9 % had iron deficiency (serum ferritin concentration <12 ng/mL). Prevalence of anaemia was high among non-EBF children (45.8%) (Table III).

The mean birth weight was 2942.9g [95% CI (2476.2, 3414.6)]. Low birth weight (BW) rate was 14.3% (121). The rate of EBF was higher among the children who were born as LBW (67.9%) when compared with normal BW (48.2%) [p=0.001; OR=1.8 (1.4-2.1)]. Rate of EBF was high in rural children [418 (65.2%)] than urban children [127 (62.0%)]; P=0.403). Rate of EBF was observed to be high in children from middle class households [334 (68.4%)].

Dietary pattern

It was found that all the children have consumed the boiled rice while 47.9% of children have consumed meat (Table IV). Mean (\pm SD) calorie intake of the children aged 12-23, 24-35, 36-47 and 48-59 months was 782.6 (\pm 150.3), 918.6 (\pm 142.5), 998.5 (\pm 139.2) and 1055 (\pm 173.5) kcal/day respectively. Mean (\pm SD) consumption of carbohydrate,

protein and fat of the children was 126.7 (\pm 20.7), 29.2 (\pm 8.5) and 34.6 (\pm 8.1) g/day respectively (Table V).

TABLE IV
Different Food items Consumed on Average Days in a Week by the Children

Type of food	No. of Children*	Percentage
Boiled rice	846	100
Products of rice flour	845	99.9
Wheat flour	595	70.3
Fish	831	98.2
Meat	405	47.9
Egg	505	59.7
Cow milk	323	38.2
Spinach	634	74.9
Murunkai leaves	81	9.6
Ponnankani	62	7.3
Vallarai	30	3.5
Akathi	12	1.4
Leeks	36	4.2
Potato	813	96.0
Carrot	715	84.5
Beetroot	85	10.0
Banana	761	89.8
Mango	146	17.2
Papaya	59	6.9
Orange	307	36.3

*Number of children from total of 846 who take the listed food items per a day.

TABLE V
Mean Consumption of Carbohydrate, Protein and Fat by Age

Consumption of food	Age (Months)	Children (No)	Mean intake (g)	Std. deviation	Minimum	Maximum
Carbohydrate	12-23	209	104.0	15.7	67.9	146.0
	24-35	239	126.3	14.3	90.0	170.9
	36-47	221	134.9	15.1	99.2	173.3
	48-59	177	143.3	14.9	107.9	181.2
	Total	846	126.6	20.6	67.9	181.2
Protein	12-23	209	23.1	7.4	10.8	46.9
	24-35	239	27.7	7.1	11.8	51.5
	36-47	221	31.6	7.6	16.4	56.9
	48-59	177	35.0	7.2	19.9	55.5
	Total	846	29.1	8.5	10.8	55.5
Fat	12-23	209	30.4	7.7	17.7	49.8
	24-35	239	33.6	7.6	20.3	50.8
	36-47	221	36.9	7.3	20.9	53.1
	48-59	177	37.9	7.3	28.0	53.8
	Total	846	34.6	8.0	17.7	53.8

Discussion

In Sri Lanka, assessments of nutritional status have been carried out periodically as a part of the DHS conducted by the Department of Census and Statistics. According to the survey carried out in 2006/2007, the prevalence of underweight, wasting and stunting among under five children was at 21.3, 14.7 and 17.3% respectively while nearly 17 % of babies were born with low birth weight¹². Although still high, prevalence of stunting and underweight has been brought down considerably within recent decades. However, wasting remains at a level,

which has been relatively unchanged for the last 30 yrs. Furthermore, the Northeast part of the Sri Lanka has more vulnerable population compared with other part of the country due to the last three decades of internal war. Even though the fast internal infrastructure development is carried out, still the health related issues specially prevalence of malnutrition is existing in Sri Lanka.

Breastfeeding has credibly been recognized as the important nutritious feeding for a child, giving short-term health benefits such as a lower risk for ear infection (Otitis media)¹⁴,

gastroenteritis¹⁵ and respiratory infections. Breastfeeding also reduces the risk of obesity and diabetes mellitus in later life¹⁶.

WHO recommends that, the estimate of EBF rates could be based on the 24-hour recall method in the cross sectional surveys. In WHO method, information is collected on breast feeding practices for 24 hrs preceding the survey¹⁷. However the 24-hr recall method can always overestimate the actual EBF rate in a population. In 24-hr recall method, investigators categorize infants who were on frequent liquids or foods, but not given those foods/liquids during the previous day as exclusively breastfed infants¹⁸. Hence, many authors have clarified the validity of 24 hr recall method^{19, 20} and studies have shown that this method significantly overestimated the rate of exclusive breastfeeding compared to the "recall since birth" method²¹⁻²³.

While exclusive breastfeeding levels have risen significantly from 50 to 75% within the 6 years period from 2001 to 2007 in Sri Lanka, some babies are still being bottle fed during this period. Thus, the first priority therefore is to ensure that for the first six months children are exclusively breastfed.

In this population, 64.4% had been exclusively breastfed until the completion of 6 months. According to DHS in 2006/07, the rate of EBF was significantly higher (75.8%) than the

present finding in children. A study carried out in Kalutara district, Sri Lanka has shown that the rate of exclusive breastfeeding was 62.2%²⁴. In Ragama (Medical Officer of Health area), Sri Lanka, the rate of exclusive breastfeeding was 67% up to 6 months²⁵. All these studies found that, the rate of EBF among children did not take place until the completion of 6 month period in Sri Lanka and most of the mothers introduced complementary foods and other preparation within the period of first 6 months since birth in Jaffna District. The low rate of EBF found in Jaffna District could be due to unawareness of the mothers on breastfeeding, employment status of mothers, low educational level of the mothers, nucleated family and poor wealth of the households. Mothers educated to primary level did not give optimal level of exclusive breastfeeding, due to ignorance and insufficient knowledge regarding breastfeeding practices²⁶. It was observed that 18% of the mothers in Jaffna District were unaware of the period of exclusive breastfeeding (as 6 months).

Among the working mothers, the rate of exclusive breastfeeding was low and they had only about 3 months of maternity leave. This clearly shows that they have stopped exclusive breastfeeding before completion of 6 months and they introduced infant formula during first 6 months period. It has been reported that, the failure of EBF

was due to work of the mothers in Sri Lanka²⁵. Furthermore, rate of EBF (68.8%) was significantly higher in the present study among mothers of extended families (346) than those mothers from nucleated families (61.4%). This might be due to the advice of elder members in family on the importance of EBF. Only 13.6% of the mothers from the fourth wealth class have exclusively breastfed their infants while 61.3% of the mothers from middle class have exclusively been breastfed. This was evidence that, mothers in the fourth class can afford to buy expensive infant formula to feed their children before 6 months of age. Only 14.1% of the employed mothers have exclusively breastfed their infants. Thus, the overall rate of exclusive breastfeeding appears low in Jaffna District. Moreover, one fourth of the mothers (23.4%) were unaware about the duration of breastfeeding as 2 yrs or beyond 2 yrs. This could be the reason for the failure of breastfeeding up to 2 yrs period in half of the studied population.

This result shows that, the major complimentary food was cooked-rice and its initiation was significantly different between male and female children. This may be due to the cultural and religious influence on the initiation of the complementary food. It has been reported that, the cultural and religious practices among the mothers had an effect on the rate of EBF all over the world²⁴.

It was evidence that, improper complementary feeding had been practised by the mothers in Jaffna. Contrast to that, 86.6% of the children had been introduced the complementary food between the age of 6-9 months, 62.7% of children were started on complementary food at 6 months, while 6.4% of children had complementary foods before 4 months and 4.4% had after 6 months in DHS reported²⁵. This has been attributed to the lack of awareness among the mothers on complementary feeding.

Study by Greer *et al*²⁷ reported that in Asian countries, 17% of the babies were fed with infant formulas before 6 months of age. There is proof that the early introduction of solid foods or infant formula can increase the risk of malnutrition in later life. The risk of malnutrition had been found high if solid foods were introduced before 6 months of age. As well as delayed introduction of complementary feeding is also a well-known cause for growth failure and iron deficiency. In this study, all the children have had infant formula while 35.6% of the children were on infant formula before 6 month of age. Some mothers believe that it is essential to give infant formula to children before 6 months for weight gain of infants. It was found that the infants of non-working mothers, who had access to adequate breast milk, were also on infant formula. These findings

clearly indicate that the improper complementary feeding and failure of EBF until the completion of 6 months are the major risk factors for malnutrition in children.

Conclusion

Based on this research finding, the rate of exclusive breastfeeding is observed to be low in Jaffna District and duration of breastfeeding of most children has not reached 2 yrs period as WHO recommendation. This shows that, 6 months of EBF is not properly practiced in the Jaffna district and this could be contributed to the high prevalence of malnutrition. This study also confirms that, improper feeding is also one of the root causes for malnutrition. Early cessation of exclusive breastfeeding

before six months depends on the educational level of mothers, employment status of mothers, type of family and wealth class of the households and some malpractices might also contribute.

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