

PJN

ISSN 1680-5194

PAKISTAN JOURNAL OF
NUTRITION

ANSI*net*

308 Lasani Town, Sargodha Road, Faisalabad - Pakistan
Mob: +92 300 3008585, Fax: +92 41 8815544
E-mail: editorpjn@gmail.com

Impact of Exclusive Breast Feeding on the Growth of Sudanese Children (0-24 Months)

Zeinab Osman Onsa and Nur Mohammed Khair Ahmed

Department of Food Science and Technology, Faculty of Agriculture, Al-Zaeim Al-Azhari University, P.O. Box 1432, Khartoum North-13311, Sudan

Abstract: This study was conducted to prove that exclusive breast feeding is the best way through which infants get their optimum nourishment, thus ensure growth and development. The general objective of this study is to investigate the growth of exclusively breast-fed (EBFD) children (0-24 months). The specific objectives aim to identify the prevalence rate of EBF, its influence on incidence of diarrhea and chest infection was also investigated. The methodology followed was descriptive analytical procedure and information was collected by a questionnaire and anthropometric measurements of infants recorded during the study period. EPI-INFO version 6.2.3. and SPSS programs version 13 were used for data analysis. Three hundred and sixty full term normal weight infants delivered at Omdurman Maternity Hospital were included in the study. The result showed that among the mothers 94% were aged 20-39 years, 70% had university education and 69% were housewives. Average family size was 4.1 and 2.5% lived below the UN poverty line. Breast-feeding was initiated by 92.8% of the mothers immediately after birth; its duration was 70.2% for 19-24 month. A new pregnancy was the major reason for stopping breast-feeding. Forty percent of the children were EBFD and they had better duration of breast-feeding at 19-24 months than the non-EBFD ($p < 0.00$). They had lower incidence of diarrhea and chest infections ($p < 0.00$) and lower episodes ($p < 0.00$). Their growth was better in term of weight for age and weight for length ($p < 0.00$).

Key words: Exclusive, breast feeding, growth children, diseases

INTRODUCTION

Adequate nutrition during infancy and early childhood is essential to ensure growth, health and development of children to their full genetic potential. Poor nutrition increases the risks of illness and is responsible directly or indirectly for one-third of the estimated 9.5 million deaths that occurred worldwide in 2006 in children <5 years of age (WHO, 2008; Black *et al.*, 2008).

The first two years of life provide a critical window of opportunity for ensuring children's maximum growth and development through optimum feeding achieved by both breast-feeding and complementary feeding. Breast milk is ideally suited for the human infant. Infants have been breast-fed since the beginning of humanity but throughout most of the second half of the 20th century, initiation and duration of breast-feeding declined in the developed countries due to acquisition of wealth, urbanization and marketing of breast milk substitutes. This decline was followed in many developing countries by urban educated well to do mothers with shorter periods of total breast-feeding which was followed by others from lower socioeconomic levels and by some rural mothers. Early nutritional deficits are linked to long term impairment of growth and health i.e., stunting. In the developed countries optimum nutrition is affordable contrary to the case in most developing countries due to

poverty and poor environmental factors hence the recurrent cycle of malnutrition and infection among the low socioeconomic strata. Many studies in a number of developing countries have shown that the greatest risk of nutritional deficiencies and growth retardation occurs in children aged 3-15 months and are associated with poor breast-feeding and complementary feeding practices (Shrimpton *et al.*, 2001).

Thus it was pertinent to design this longitudinal study following the growth of exclusively breast-fed children and those who were not exclusively breast-fed from birth up to 24 months of age using the WHO criteria of exclusive breast-feeding (breast milk only for the first 6 months). The investigation was carried out in Omdurman Maternity Hospital during the period of the first of February to the end of August 2010 and after discharge the children were followed up monthly by home visits. To our knowledge no such study was reported in Sudan before. The main objective of this study is to investigate the effects of exclusive breast-feeding on the growth of children during the first 24 months after birth.

MATERIALS AND METHODS

This is a longitudinal study on children from birth to age 24 months conducted during the period of first

February 2010 August 2012. In Khartoum state, the capital and the most populated state in Sudan. Its population is approximately 5 million (CBS, 2008) and they come from all parts of the country. The study sample was chosen from Omdurman Maternity Hospital which was the first hospital specialized in obstetric care in Sudan and as such is the largest Baby Friendly Hospital in Sudan. The delivery rate during the six months was 10.500 births.

Subject: Included in the study was all healthy Sudanese pregnant women resident of Khartoum State coming for hospital booking in Omdurman Maternity Hospital at the ninth months of pregnancy that consented to take part in the study. No limitation was set on age, ethnicity or socioeconomic status. Their normal full term infants who weighed >2.5 kg at birth were also included.

Exclusion criteria: Excluded were neonates who were critically ill, with congenital abnormalities or weighing <2.5 kg at birth.

Sample size: Sample size was chosen according to the formula of (Robert and Torrie, 1960) Methodology Data was collected by a questionnaire designed to elicit information on demographic, socioeconomic status, anthropometric measurements and breast-feeding practices from the mothers. The questionnaire was completed by the author assisted by two nutritionists and two nutrition assistants. It was tested in a pilot scale (40 samples) and appropriate improvements were made.

Evaluation of the nutritional status: The nutritional status of children was evaluated using Z-scores for weight for age, weight-for-height and height for age. Under nutrition (underweight, wasting, stunting) was defined as <-2 SD below that expected on the basis of the international NCHS (2000).

Data analysis: Anthropometric indicators (Weight for age Z-score, weight-for-height Z-score and height for age Z-score) were computed using Epi-Info version 6.2.3 and SPSS version 13 programs used for data analysis. Results were tested for significance using simple chi-square test and stepwise multiple regression analysis values of <0.05 was considered significant.

RESULTS

Socioeconomic conditions: Mothers' age was in the 20-39 years range (93.9%), 4.4% of the mothers were <20 or 1.7% >40 years old. Family size varied, major size consisted of 4-5 members (43.1%), then <4 (30.2%) and lastly >5 (26.7%) with an average size of 4.11 persons/house. Husbands were head of most of the families (94.4%). Seventy percent of the mothers had

university education while 23.9% had secondary education and 6.1% had <8 years education; and none of them was illiterate. On the other hand, 67.5% of the fathers had university education, 25.5% secondary level, 6.7% had <8 years education and only one father was illiterate. Most of the mothers (68.9%) were housewives while 31.1% were working. The majority of the fathers (58.6%) were self-employed while 30.3% were laborers, 1.4% employees and 9.7% were unemployed (Table 1).

Household status: Household status is shown in Table 2. Most of the families (71.9%) owned their homes and 26.1% rented them and the remaining 2% were gifts from their parent. Household type was mostly of red-bricks (67.5%), 26.7% concrete built with few mud houses (4.4%) or shelters (1.4%). 72.2% of the houses had 2 or 3 rooms, 15.3% had >3 rooms and 12.5% had one room only. Houses had piped water (96.1%), siphon (51.9%) or pit-latrines (48.1%) facilities and electric supply (95.3%). Most of the houses had gas-cookers (91.1%), refrigerators (89.2%) and TVs (91.9%).

Table 1: Socio demographic characteristics

Factor	Description	No.	Percentage
Residency	Omdurman	234	65.0
	Khartoum North	90	25.0
	Khartoum	36	10.0
	Total	360	100
Mother's age	<20	16	4.4
	20-29	185	51.4
	30-39	153	42.5
	>40	6	1.7
Total	360	100	
Family size	<4	109	30.2
	4-5	155	43.1
	>5	96	26.7
	Total	360	100
Household head	Occupancy (persons/house)	4.11	-
	Father	340	94.4
	Mother	5	1.4
	Both parents	4	1.1
	Relatives	11	3.1
Total	360	100	
Parents' education: Mother	Illiterate	0	0.0
	>8 years	22	6.1
	Secondary	86	23.9
	University	252	70.0
Total	360	100	
Father	Illiterate	1	0.2
	>8 years	15	4.2
	Secondary	92	25.5
	University	243	67.5
Total	360	99.9	
Parents' occupation: Mother	Housewife	248	68.9
	Working mother	112	31.1
	Total	360	100
Father	Self employed	211	58.6
	Laborer	109	30.3
	Employee	5	1.4
	Unemployed	35	9.7
	Total	360	100

Table 2: Housing status of 360 respondents

Factor	Description	No.	Percentage
House ownership	Owned	259	71.9
	Rented	94	26.1
	Others	7	1.9
	Total	360	99.9
House type	Shelter	5	1.4
	Mud	16	4.4
	Red brick	243	67.5
	Concrete	96	26.7
	Total	360	100
No. rooms	One	45	12.5
	Two	116	32.2
	Three	144	40.0
	> Three	55	15.3
	Total	360	100
Water source	Tap	346	96.1
	Peddler	14	3.9
	Total	360	100
Toilet	Siphon	187	51.9
	Pit latrine	173	48.1
	Total	360	100
Electric supply available	Yes	343	95.3
Gas cooker-available	Yes	328	91.1
Refrigerator-available	Yes	321	89.2
TV-available	Yes	331	91.9

Monthly income (SDG): Most of the families (61.1%) had monthly incomes of >900 SDG, 16.7% of 601-900, 19.7% of 301-600 and only 2.5% of <300 SDG (Table 3).

Breast-feeding practices: Breast-feeding practices are shown in Table 4. The majority 92.8% of the mothers initiated breast-feeding immediately after birth while the rest were equally distributed either ½ h or more than one hour after giving birth (3.6% each). A majority of the children (72.5%) were breast-fed 9-16 times/day, the rest 1-8 times. However, only 48.3% of the children showed satisfaction after they were breast-fed. Prolonged breast-feeding for the total number of children was as follows: 70.2% were breast-fed for 19-24 months, 16.7% for 13-18 months, 10.5% for 7-12 months and only 2.5% for <6 months. Further categorization showed that in every period, more of the exclusively breast-fed children were breast-fed compared to those who were not exclusively breast-fed including the 19-24 months period (79.2% vs., 64.3%, respectively). Reasons cited for cessation of breast-feeding were: new pregnancy (49.4%), Ramadan month (22.5%) or mother had no desire to breast-feed (22.2%). Few stopped breast-feeding due to illness of the mother (3.9%) or child (1.9%).

Exclusive breast-feeding: Three hundred and sixty mothers and newborns were selected for this study. Exclusively breast-fed children were 144 (40.0%) compared to 216 (60.0%) who were not exclusively breast-fed.

Table 3: Distribution of monthly income (SDG)

Income (SDG)	No.	Percent
>300	9	2.5
301-600	71	19.7
601-900	60	16.7
>900	220	61.1
Total	360	100

Table 4: Breast-feeding practices of 360 mothers

Practice	Description	No (%)	
Initiation of breast-feeding	Immediately after birth	334 (92.8)	
	½ hour after birth	13 (3.6)	
	> 1 hour after birth	13 (3.6)	
	Total	360 (100)	
No. breast feed/day	1-8 times	99 (27.5%)	
	9-16 times	261 (72.5%)	
	Total	360 (100)	
Child satisfaction after feeding	Yes	174 (48.3)	
	No	186 (51.7)	
	Total	360 (100)	
Breast-feeding duration	1-6 months	9 (2.5)	
	7-12 months	38 (10.5)	
	13-18 months	60 (16.7)	
	19-24 months	253 (70.2)	
	Total	360 (100)	
	Mean	20.5 ± 5.3	
EBF vs non-EBF			
duration	1-6 months	1 (0.7)	8 (3.7)
	7-12 months	11 (7.6)	27 (12.5)
	13-18 months	18 (12.5)	42 (19.4)
	19-24 months	114 (79.2)	139 (64.3)
	Total	144 (40.0)	216 (60.0)
Reasons for stopping breast-feeding	New pregnancy	178 (49.4)	
	Ramadan month	81 (22.5)	
	No desire	80 (22.2)	
	Mother illness	14 (3.9)	
	Child illness	7 (1.9)	
	Total	360 (100)	

Growth of exclusively breast-fed children: Growth of exclusively breast-fed children compared to those who were not was assessed using the indicators weight for age and weight for height Z-scores.

Weight for age: At age 6 months, exclusively breast-fed children had lower incidences of underweight (1.4% vs., 3.2%) than those who were not (Table 5) but the differences were not significant ($p < 0.27$). At 12 months old, only 0.7% of the exclusively breast-fed children suffered underweight compared to 7.4% among non-EBFD children and the difference was found to be significant ($p < 0.00$). Similarly among the 18 months old children (1.4% vs., 6.9%) there was a significant difference ($p < 0.03$). Among the oldest children (24 months), no underweight case was observed among the exclusively breast-fed children compared to 9.3% among those who were not EBFD and the difference was highly significant ($p < 0.00$). No severe underweight cases were observed among the exclusively breast-fed children during the 24 months and only one case among those who were not.

Table 5: Growth of exclusively breast-fed children compared to non-EBFD (weight for age)

Age (months)	Breast-feeding	Weight for age			Total
		Normal	Moderate	Severe	
6	EBF	142 (98.6)	2 (1.4)	0 (0.0)	144 (100)
	Non-EBF	209 (96.8)	7 (3.2)	0 (0.0)	216 (100)
p<0.27	Total	351 (97.5)	9 (2.5)	0 (0.0)	360 (100)
12	EBF	143 (99.3)	1 (0.7)	0 (0.0)	144 (100)
	Non-EBF	200 (92.6)	16 (7.4)	0 (0.0)	216 (100)
p<0.00	Total	343 (95.2)	17 (4.8)	0 (0.0)	360 (100)
18	EBF	142 (98.6)	2 (1.4)	0 (0.0)	144 (100)
	Non-EBF	200 (92.6)	15 (6.9)	1 (0.5)	216 (100)
p<0.03	Total	342 (95.0)	17 (4.7)	1 (0.3)	360 (100)
24	EBF	144 (100)	0 (0.0)	0 (0.0)	144 (100)
	Non-EBF	196 (90.7)	20 (9.3)	0 (0.0)	216 (100)
p<0.00	Total	340 (94.4)	20 (5.6)	0 (0.0)	360 (100)

Table 6: Growth of exclusively breast-fed children compared to NEBFD (weight-for-length)

Age (months)	Breast-feeding	Weight for length			Total
		Normal	Moderate	Severe	
6	EBF	128 (88.9)	12 (8.3)	4 (2.8)	144 (100)
	Non-EBF	171 (79.2)	38 (17.6)	7 (3.2)	216 (100)
P<0.04	Total	299 (83.0)	50 (13.9)	11 (3.1)	360 (100)
12	EBF	143 (99.3)	1 (0.7)	0 (0.0)	144 (100)
	Non-EBF	196 (90.7)	18 (8.3)	2 (1.0)	216 (100)
P<0.00	Total	339 (94.2)	19 (5.3)	20 (0.5)	360 (100)
18	EBF	130 (90.3)	13 (9.0)	1 (0.7)	144 (100)
	Non-EBF	153 (70.8)	52 (24.1)	11 (5.1)	216 (100)
P<0.00	Total	283 (78.6)	65 (18.1)	12 (3.3)	360 (100)
24	EBF	137 (95.1)	7 (4.9)	0 (0.0)	144 (100)
	Non-EBF	170 (78.7)	43 (19.9)	3 (1.4)	216 (100)
P<0.00	Total	307 (85.3)	50 (13.9)	3 (0.8)	360 (100)

Table 7: Effects of exclusive breast-feeding on diarrheal/chest infection episodes during the first 6 months

Disease	Episode/No	Breast-feeding practice		Total
		EBF	Non-EBF	
Diarrhea	Yes	28 (19.4)	86 (39.7)	114 (31.7)
	No	116 (80.6)	130 (60.3)	246 (68.4)
p<0.00	Total	144 (100)	216 (100)	360 (100)
p<0.00	Episode No.1	24 (16.6)	48 (22.2)	72
	2	4 (2.8)	21 (9.7)	25
	3	0 (0.0)	17 (7.8)	17
	Total	28 (19.4)	86 (39.7)	114 (31.7)
Chest infection	Yes	33 (22.9)	84 (38.9)	117 (32.5)
	No	111 (77.1)	132 (61.1)	243 (67.5)
p<0.00	Total	144 (100)	216 (100)	360 (100)
p<0.00	Episode No.1	27 (18.7)	53 (24.5)	80
	2	3 (2.1)	25 (11.6)	28
	3	3 (2.1)	6 (2.8)	9
	Total	33 (22.9)	86 (38.9)	117 (32.5)

Weight for length: At age 6 months, exclusively breast-fed children had lower incidence of wasting compared with those who not (11.1 vs., 20.8%) including cases of severe wasting (2.8 vs., 3.2%) as shown in Table 6 The difference in wasting was significant (p<0.04). Similarly, 12 months old exclusively breast-fed children had lower incidence of wasting (0.7 vs., 9.3%) including cases of severe wasting; the differences were significant (p<0.00). At 18 and 24 months, those who were not exclusively breast-fed had 3 times and 4.3 times incidences of wasting compared with those who were. In both cases the differences were significant (p<0.00). Effects of exclusive breast-feeding on disease episodes

Diarrhea and chest infections are the commonest infectious diseases among children in Sudan. Hence, the influences of EBF on diarrheal/chest infections incidence and the number of episodes were investigated (Table 7). Exclusively breast-fed children had lower incidences of diarrhea than those who were not (19.4 vs., 39.7%), the differences were highly significant (p<0.00). They had also lower number of diarrheal episodes and lower rates in each episode: first episode (16.6 vs., 22.2%), second episode (2.8 vs., 9.7%) and third episode (0.0 vs., 7.8%). The differences in the number of episodes was also highly significant (p<0.00). Similarly, 22.9% of the exclusively breast-fed

children suffered from chest infections compared to 38.9% among those who were not exclusively breast-fed. The formers also had lower number of episodes: first episode (18.7 vs., 24.5%), second episode (2.1 vs., 11.6%) and third episode (2.1 vs., 2.8%). In both cases the differences were highly significant ($p < 0.00$ and $p < 0.00$, respectively).

DISCUSSION

Socioeconomic conditions: Mother ages were within the age group 20-39 years (94%) which is the prime age for child bearing. The <20 years range was higher than Haroun *et al.* (2008) and lower than Omer *et al.* (1987) while the >40 years range was lower than both authors. Seventy percent of the mothers were highly educated (university level). This is a positive factor as in developing countries female education was associated with better nutrition as shown by reduced infant mortality rate reported by UNICEF (1990), Bhargava (2006) and an increase in children's mean daily intake of nutrients (Devdas *et al.*, 1980; Bhuiya *et al.*, 1986; Brahman, 1988; Osmani, 1997). Education, especially at a higher level, is an enhancer for better care-giving for the children as was reported by Rogers and Young (1988).

Most of the mothers were housewives (ca. 69%), the rest were engaged in different income generating activities. This was similar to the 70% figure reported by Omer *et al.* (1987) for the urban economically privileged well educated families in Khartoum but much lower than the 82.5% reported by Haroun *et al.* (2008) in Wad Medani town. Fathers' level of education was similar to that of the mothers, that is, highly educated. Father's education is an important determinant of household wealth and is believed to affect child health indirectly through its effect on household income (Mosley and Chen, 1984).

A high proportion of the fathers (58.6%) were self-employed and 30.3% were laborers, however, 9.7% were unemployed at the time of the survey. Thus 90% of the husbands were income earners while about 70% of the mothers were housewives which explain why 94.4% of the households were headed by men, which is the norm in the northern and central parts of Sudan where a mother heads a family only if divorced or husband deceased. Average household size was 4.11 which were lower than the national average of 6.1 (SHHS, 2006).

This was an urban sample while the national sample included rural areas where large family members are the norm. Most of the families owned their houses, most of the houses were built of red-bricks or concrete and most of the families had three rooms or more. In addition, nearly all of the households had tap water and all had toilet facilities whether siphon or pit-latrines. This showed that most of the households were comfortable according to local standards enjoying electric supply and availability of gas cookers, refrigerators and TV sets. The

economic status of a household is an important indicator of adequate access to food supplies, use of health services, availability of improved water sources and sanitation which are prime determinants of child nutritional status (UNICEF, 1990). The World Bank/UN poverty line of 1 US\$ /person/day when applied to the studied sample is equivalent to 308 SDG/family/month (1 US\$ equivalent to 2.5 SDG). In this study the majority (ca. 78%) lived above the poverty line of 2 US\$/person/day and only 2.5% of the families lived under the UN poverty line of <1 US\$/day. This explains the comfortable living conditions enjoyed by most of the families mentioned above.

Breast-feeding practices

Initiation of breast-feeding: Breast feeding (BF) immediately after birth allows the child the benefit of colostrum (Singh, 1992). It releases the hormone oxytocin which assists in the involution of the uterus and aids in the cessation of bleeding (Chau *et al.*, 1994; Sobhy and Mohame, 2004) as the delay or abstinence from breast-feeding results in increased postpartum bleeding (Marchant *et al.*, 2006). In this study, BF was initiated by 92.8% of the mothers immediately after birth and 3.6% half hour after birth thus 96.4% were breast-fed. This was not reported by previous studies in Sudan, which is a higher figure than that reported in rural (71.6%) and urban (29.5%) areas in Khartoum by Omer *et al.* (1987), BF rate within one hour after birth was 54.2% in Wad Medani town as reported by (Haroun *et al.*, 2008) and was 66% for Sudan (SMS, 1999). BF rate according to the WHO (2003) guidelines was very good (90-100%) in this study compared with a good rate (50-80%) registered by previous studies (Haroun *et al.*, 2008; SMS, 1999; Omer *et al.*, 1987). The reason was better educational level of the mothers in this study when compared with Haroun *et al.* (2008) sample as more mothers had university education (70.0 vs., 15.1%).

Prolonged breast-feeding: Duration of BF was mostly (70.2%) for 19-24 months this will be compared with Haroun *et al.* (2008) because similar periods were used. Most of the mothers in this study breast-fed for longer periods compared with Haroun *et al.* (2008) (48.2% for 19-24 months) which could possibly be due to the higher level of education hence higher level of awareness of the benefits of continued breast-feeding to 24 months. Continued BF to 24 months by the majority in this study is in accordance with WHO (2002) recommendations which can provide one-half of the requirements at age 6-12 months and one-third in the second year (WHO/University of California-Davies, 1998). It can cover 35-40% of energy needs (Dewey and Brown, 2003) as previous studies showed in Uganda (Rutishanser, 1974) and Kenya (Van Steanbergen *et al.*, 1981). In addition, breast milk provides extra

amounts of vitamin A, calcium, riboflavin (Prentice and Paul, 2000). Prolonged BF reduces childhood illness (Reynolds, 2001), specifically diarrhea as it lowers its episodes (Feacham and Koblinsky, 1984) reduces its severity (Clemens *et al.*, 1986) and its impact on growth (Zumrawi *et al.*, 1987; Roland *et al.*, 1988). Breast milk also prevents dehydration and provides vital nutrients required for recovery (Brown *et al.*, 1990) improves cognitive outcome (Reynolds, 2001) and may influence the immune system development (Goldman, 1993; Jackson *et al.*, 2006). The major reason cited for stopping BF was a new pregnancy (49.4%). This was also the major reason reported by Haroun *et al.* (2008) with a slightly higher rate (54.1%).

Exclusive breast-feeding

Exclusively breast-fed: In this study, 40.0% of the women practiced EBF which was a higher figure than the 29.5% reported by Haroun *et al.* (2008) and the 16% rate in Sudan reported by UNICEF (2008). Exclusively breast-fed infants had better duration of BF at 19-24 months, 79.2% compared with 64.3% for non-exclusively breast-fed infants, the difference was significant ($p < 0.01$).

Effects of exclusive breast-feeding on infants growth during 24 months: In this study, EBFD children growth was better than those who were not EBFD in terms of weight and length gain. This is in agreement with Cohen *et al.* (1994) who reported that EBF for 6 months resulted in weight gain in Honduras and that cessation between 4-6 months confers no advantage on growth (Cohen *et al.*, 1994; Dewey *et al.*, 1999). It is also in accordance with Dnayade *et al.* (2004) that EBFD infants for 6 months in Nigeria had mean weight above those EBFD to 4-6 or <4 months and that EBF supported adequate growth for the first 6 months. Lastly, result agreed with Otaigbe *et al.* (2008) that the growth of EBFD infants in the first 6 months compared favorably with the WHO/NCHS reference.

Effects of exclusive breast-feeding on infections:

Diarrhea and chest infections are major diseases among the under five years old (SHHS, 2006) in Sudan. In this study, exclusively breast-fed infants had significantly lower incidence of diarrhea ($p < 0.00$) and its episodes ($p < 0.00$) compared to those who were not exclusively breast-fed. Similarly, there were significant reductions in both incidences and number of episodes for chest infections. Thus EBF for 6 months protected the infants which agreed with earlier reports (Feacham and Koblinsky, 1984; Brown, 1989; Kramer and Kakura, 2002) as breast milk contains numerous protective factors against infections. Many of the non-EBFD infants were also taking breast milk but amounts taken were definitely lower than those by the EBFD ones since intake of fluids and complimentary foods displace part of

the breast milk (Bell *et al.*, 1987; Dewey *et al.*, 1999). Fewer illnesses and lesser episodes were reported by the EBFD for 6 months compared to those EBFD for 4-6 months and by the 4-6 months compared to <4 months EBFD in Nigeria (Dnayade *et al.*, 2004).

Conclusion: Conclusion's that can be withdrawn from the study:

- 1: Breast-feeding initiation rate was very good and also its duration for 19-24 months. New pregnancy was the major reason for cessation of breast-feeding
- 2: EBF rate of 40.0% was low. However, it caused better duration of breast-feeding till age 19-24 months and gave better protection against incidence and frequency of diarrhea and chest infections
- 3: EBF supported better growth of children in terms of weight for age or weight for length during
- 4: The first 6 months compared to when <4 or 4-6 months
- 5: The 24 months (EBFD vs total non-EBFD)
- 6: Weight for length was found to be a more sensitive indicator than weight for age for measuring the growth of children 0-24 months old
- 7: This study reports for the first time rate of immediate initiation of breast-feeding
- 8: First report on growth of EBFD children during 24 months

Recommendations: The following recommendations are suggested:

- 1: Mothers are strongly advised to exclusively breast-feed for 6 months without offering even water and to extend the duration of breast-feeding for 24 months
- 2: Better personal hygiene and general sanitation to reduce the incidence of infections
- 3: Use of weight for length is the indicator of choice for measuring growth of 0-24 month's old children

REFERENCES

- Bell, J.G., C.I. Keen and B. Lonnerdal, 1987. Effect of infant cereals in zinc and copper absorption during weaning. *Am. J. Clin. Dis. Child.*, 131: 1128-1132.
- Bhargava, A., 2006. *Econometrics statistics and computational approaches in food and health science*, Singapore: World scientific.
- Bhuiya, A., B. Wojtyniak, S. D'Sonza and S. Zimicki, 1986. Socio-economic determinants of child nutritional status: boys versus girls. *Food Nutr. Bull.*, 8: 3-7.
- Black, R.E., I.H. Allen, Z.A. Bhutta, L.E. Caulfield M. de Onis, M. Ezzati, C. Matheus and J. Rivera, 2008. Maternal and child under nutrition: global and regional exposures and health consequences. *Lancet*, 371: 243-60.

- Brahman, G.N.V., 1988. Intra family distribution of dietary energy-an Indian experience. *Ecol. Food Nutr.*, 22: 150.
- Brown, K.H., 1989. Infant feeding practices and their relationship with diarrheal and other diseases in Huascar (Lima), Peru. *Pediatrics*, 83: 37-40.
- Brown, K.H., R.Y. Stallings, de H.C. Kanashiro, Lopez de G. Romana and R.E. Black, 1990. Effect of common illnesses on infants' energy intakes from breast milk and other foods during longitudinal community-based studies in Huascar (Lima) Peru. *Am. J. Clin. Nutr.*, 52: 1005-1013.
- CBS, 2008. Population Census, Central Bureau of Statistics, Khartoum.
- Chau, S., S. Arulkumaram, E. Linn, N. Selamat and S.S. Ratnam, 1994. Influence of breast feeding and nipple stimulation on postpartum uterine activity. *BJOG: An Int. J. Obstetrics and Gynaecol.*, 10: 804-805.
- Clemens, I.D., B. Stanton, B. Stoll, N.S. Shahid, H. Bamu and A.K.M.A. Chowdhury, 1986. Breastfeeding as a determinant of severity in shigellosis. *Am. J. Epidemiol.*, 123: 710-720.
- Cohen, R.J., K.J. Brown, J. Canahuau, L.L. Rivera and K.G. Dewey, 1994. Effects of age of introduction of complementary foods on infant breastmilk intake, total energy intake and growth. A randomized intervention study in Honduras. *The Lancet*, 334: 288-293.
- Devdas, R.P., R. Rajlakshmi and R. Kaveri, 1980. Influence of family income and parent's education on the nutritional status of preschool children. *Indian J. Nutr., Diet.*, 17: 237-243.
- Dewey, K.G. and K.H. Brown, 2003. Update on technical issues concerning complementary feeding of young children in developing countries and implications for intervention programs. *Food Nutr. Bull.*, 24: 5-28.
- Dewey, K.G., R.J. Cohen, K.H. Brown and L.L. Rivera, 1999. Age of introduction of complementary foods and growth of term, low birth weight, breast-fed infants. A randomized intervention study in Honduras. *Am. J. Clin. Nutr.*, 69: 679-686.
- Dnayade, A.A., T.C. Abiona, I.O. Abayoriu and R.O. Makanjuola, 2004. The first 6 months of growth and illness of exclusively and non-exclusively breastfed infants in Nigeria. *East Afr. Med. J.*, 81: 146-153.
- Eacham, R.G. and M.A. Koblinsky, 1984. Intervention for the control of diarrheal diseases among young children: promotion of breastfeeding. *Bull. WHO*, 62: 271-291.
- Goldman, A.S., 1993. The immune system of human milk. Antimicrobial, anti inflammatory and immunomodulating properties (review). *Pediatr Infect Dis. J.*, 12: 664-672.
- Haroun Huda, M., M.S. Mahfouz and B.Y. Ibrahim, 2008. Breast feeding indicators in Sudan: A case study of Wad Medani town. *Sudanese J. Pub. Health*, 3: 81-90.
- Jackson, K., M. Kelly and A.M. Nagar, 2006. Breastfeeding, the immune response and long term health (review). *JAOA*, 106: 203-207.
- Kramer, M.S. and R. Kakura, 2002. Optimal duration of exclusive breast feeding (Review). *Cochrane Database of Systemic Reviews*, Issue 1, Art.No:CD0035/7.
- Marchant, S., J.O. Alexander, P. Thomas, J.O. Garcia, P. Brocklehurst and J. Keene, 2006. Risk factors for hospital admission related to excessive and prolonged postpartum vaginal blood loss after the first 24 hours following child birth. *Pediatric and Perinatal Epidemiol.*, 20: 392-402.
- Mosley, W.H., and L.C. Chen, 1984. An analytical framework for the study of child survival in developing countries. *Population and Develop. Rev.*, 10: 25-45.
- NCHS, 2000. National centre for health statistics version, centers for diseases control (CDC) and prevention 2000, Growth chart for the United States. Improvement to the 1977.
- Osmani, S.R., 1997. Poverty and nutrition in South Asia. ACC/SCN Symposium, Katamandu, March 1997. Nutrition Policy Paper No.16, November 1997. ACC/SCN, Geneva.
- Omer, M.I.A., G.I. Suliman, K.A. Mohamed, A.R. El Mufti, K. Zahir, Y. Hofvander and U-B. Lithelf, 1987. Breast feeding and weaning in the Sudan Contemporary patterns and influencing factors. *J. Trop. pediatr.*, 33: 2-12.
- Otaigbe, B.E., E.A. Alikr and K.E. Nkanginieme, 2008. Growth pattern of exclusively breastfed infants in the first 6 months of life: a study of babies delivered at the University of Port Harcourt Teaching Hospital, Rivers State, Nigeria. *Niger J. Med.*, 17: 317-323.
- Prentice, A.M. and A.A. Paul, 2000. Fat and energy needs of children in developing countries. *Am. J. Clin. Nutr.*, 72: 1253-65.
- Reynolds, A., 2001. Breastfeeding and brain development. *Ped. Clin. N. Amer.*, 48: 159-172.
- Rogers, B. and N. Young, 1988. The importance of women's involvement in economic activities in the improvement of child nutrition and health. *Food Nutr. Bull.*, 10: 33-41.
- Robert, G.D.S. and J.H. Torrie, 1960. Principles and procedures of statistics with special reference to biological sciences ch. 5. McGRAW-Hill: Book company Inc, New York.
- Rowland, M.O.M., S.G.J.G. Rowland and T.J. Cole, 1988. Impact of infection on the growth of children 0 to 2 years in an urban West African community. *Am. J. Clin. Nutr.*, 47: 134-138.
- Rutishhanser, I.H.E., 1974. Factors affecting the intake of energy and protein by Ugandan preschool children. *Ecol. Food Nutr.*, 3: 213-222.

- Shrimpton, R., C.G. Victora, de M. Onis, R.C. Lima, M. Blossner and G. Clugston, 2001. Worldwide timing of growth faltering: Implications for nutritional intervention. *Pediatrics*, 107: 1-7.
- Singh, K., 1992. Effect of colostrums on infant mortality: urban, rural differentials. *Health and Population*, 15: 94-100.
- SHHS, 2006. Sudan Household Health Survey. National Report-Government of National Unity/Government of Southern Sudan/WFP/UNFPA/WHO/USAID, Khartoum.
- SMS, 1999. Safe Motherhood Survey, West Kordofan. Federal Ministry of Health, Central Bureau of Statistics and United Nations Population Fund, Khartoum.
- Sobhy, S.I. and N.A. Mohame, 2004. The effect of early initiation of breastfeeding on the amount of vaginal loss during the fourth stage of labor. *J. Egypt. Pub. Health Assoc.*, 79: 1-12.
- UNICEF, 1990. Strategies for improved nutrition of children and women in developing countries, New York.
- UNICEF, 2008. The State of the World's Children 2008. Statistical Tables, New York.
- Van Steenberg, W.M., J.A. Kusin and van M.M. Rens, 1981. Lactation performance of Kamba mothers, Kenya breastfeeding behavior, breast milk yield and composition. *J. Trop. Pediatr.*, 27: 155-161.
- WHO, 2008. The global burden of disease: 2004 update. Geneva.
- WHO, 2002. Global strategy for infant and young child feeding. *WHA55/2002/REC/1 Annex 2*. Geneva.
- WHO, 2003. Infant and young child feeding-A tool for assessing national practices, policies and programmes. WHO, Geneva.
- WHO/University of California, Davies, 1998. Complimentary feeding of young children in developing countries: A review of current scientific knowledge. WHO, Geneva.
- Zumrawi, F.Y., H. Dimond and J.C. Waterlow, 1987. Effects on infection on growth in Sudanese children. *Hum. Nutr. Clin. Nutr.*, 41C: 4.