

Factors Associated with Duration of Exclusive Breastfeeding

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Abstract

To estimate the probabilities of various factors at various time intervals for duration of exclusive breastfeeding, the present study was done at the well baby clinic. Mothers with infants below one year of age were selected and interviewed. The median duration of exclusive breastfeeding (EBF) was found 6 months. Relationship between duration of EBF and practice of breastfeeding (on demand or at fixed time) was studied and found statistically not significant ($p>0.05$) by log rank test. Other factors affecting EBF were also studied like literacy, type of family and monthly family income. Median duration of EBF was found more (7 months) for illiterate women than for literate (6 months) and statistically significant ($p<0.05$). On testing equality of survival prospects for duration of EBF as per type of family, log rank test was found not significant ($p>0.05$). A statistically significant difference was observed while testing two different groups based on total family income.

INTRODUCTION

The benefits of prolonged breastfeeding for mother and infant health are documented in a vast scientific literature. All women should be enabled to practice exclusive breastfeeding (EBF) and all infants should be fed exclusively on breast milk from birth to 4 to 6 months of age and thereafter, children should continue to be breastfed, while receiving appropriate and adequate complementary foods, for upto 2 years of age or beyond (1). Too early introduction of breast milk substitutes and too late introduction of semi solid complementary feeds are common and are responsible for rapid increase in the prevalence of under nutrition between 6-24 months (2). Exclusive breastfeeding defined by World Health Organization (WHO) as practice of feeding only breast milk (including expressed breast milk) and allows the baby to receive vitamins, minerals or medicines and water, breast milk substitutes, other liquids and solid foods are excluded. World Health Assembly of WHO in 2001 made resolution that exclusive breastfeeding for the first six months is the most appropriate infant feeding practice (3). Recent developments suggest full breastfeeding should continue to six months (4). There is good evidence that two more months of EBF from fourth to six months provides infants with additional protection against gastrointestinal and acute respiratory infections during that two months period (4, 5).

This study was done to estimate the probability of exclusive breastfeeding since birth at various time intervals for a group of women incorporating some censored cases through survival analysis procedure. In survival analysis, censored cases are cases for which the second event is not recorded or simply does not occur before the end of the study. First event is time after birth of child when breastfeeding starts and second event refers to the end of EBF when some food supplements are introduced and breastfeeding becomes partial if continues. So, those women reporting continuance of EBF on the date of interview were considered as censored cases and for this situation, survival analysis technique, method of estimating time to event models in presence of censored cases is useful. As the study is based on interview of mothers, there remain some elements of subjectivity, recall lapses and digit preference. A variation of cohort study is the historically prospective design where a general sample (usually of women) from population is asked to recall their breastfeeding history (6). As this is a historically prospective study, it therefore introduces the recall bias which is a limitation of this study.

The aim of this study was to analyze the observed data on duration of EBF of a group of women who had delivered a child within last one year from survey date. Survival analysis method using life table and Kaplan Meier methods was applied and conditional probability of survival (continuance of EBF), at monthly interval of time were obtained. The

relationship between duration of EBF and practice of feeding at fixed time or on demand of the child, illiterates and literates, nuclear family and joint family and monthly family income (upto Rs.3000 and above Rs. 3000) was also studied and their survival aspects were compared by using log rank test.

MATERIAL AND METHODS

This study was conducted at New Civil Hospital, Surat from April, 2007 to June, 2007. Total 277 women, with their infants attending the well baby clinic for child immunization were interviewed. Consecutive attendees were selected to minimize selection bias. So it is a purposive type of sampling which is feasible at well baby clinic. Considering prevalence of EBF 39.7% (7), the sample size was calculated as 276 mothers using EPI6 software. Inclusion criteria includes women aged 20-34 years as majority of women belongs to this age group, parity of any order, visiting the immunization centre with youngest child for vaccination and young child have not completed one year.

All 277 women were interviewed using pretested questionnaire including demographic information, marital duration, number of conceptions, number of birth, age of youngest child, duration of exclusive breastfeeding, pattern of breastfeeding like at fixed time or on demand. As this is historically prospective study, data is collected in descriptive manner. In this time to event study, event or death is termination of EBF and it occurs only once and so by asking questions in retrospective manner this can be identified but it introduces the recall bias and it is the limitation of this study.

Questions were asked to women under study about their duration of EBF in months related with youngest child. Those women who were continuing EBF on the date of interview were considered censored cases and their duration of EBF was recorded and treated as censored data, as it was not known when would they discontinue EBF and start weaning. They contribute valuable information and should not be omitted from the analysis. It would also be wrong to treat the observed time at censoring as exclusive breastfeeding termination time. A statistical technique useful for this data is survival analysis. Life table and Kaplan Meier method is used to subdivide the period of observation into smaller time intervals and for each interval, all who have been observed atleast that long are used to calculate the probability of a terminal event occurring in that interval. The probabilities estimated from each of the intervals are then used to estimate the overall probability of the event

occurring at different time points. There are three assumptions for this methodology (8). First, at any time subjects who are censored have same survival prospects as those who continue to be followed. Second, survival probabilities are the same for subjects recruited early and late in the study. Third, the event happens at the time specified. Survival probabilities, standard error, hazard rate and median survival time have been obtained. Log rank test was also applied to compare survival experiences of groups.

RESULTS

The data collected were analyzed using Stats Direct version 2.6.3 statistical software and results are shown in the following tables. Out of 277 women surveyed, 240 (86.6%) reported termination of EBF on or before survey date (terminal event). Remaining 37 (13.4%) cases are censored cases as they were still continuing EBF on the survey date. Majority of women were in the age range of 20-34 years, were housewives and belonging to middle or lower class families and coming from urban area.

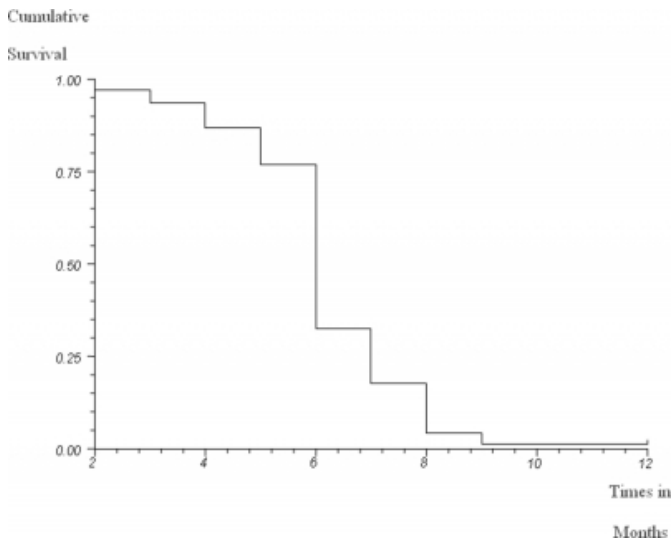
Figure 1

Table 1: Cumulative probabilities for exclusive breastfeeding using survival analysis

(1) Full Breast- feeding Interval (Months)	(2) Interval start time	(3) No. entering this interval	(4) No. of terminal events	(5) No. of censored cases	(6) Proportion Surviving	(7) Survival Probability at end of interval	(8) S.E. of Survival Probability	(9) Hazard Rate
0-1	0	277	0	0	1	1	0.0000	0.0000
1-2	1	277	0	0	0.9711	0.9711	0.0100	0.0293
2-3	2	277	2	5	0.9346	0.9075	0.0149	0.0676
3-4	3	270	1	2	0.8683	0.7880	0.0204	0.1411
4-5	4	267	0	4	0.7681	0.6053	0.0256	0.2637
5-6	5	263	19	14	0.3254	0.1969	0.0287	1.1225
6-7	6	230	49	10	0.1762	0.0347	0.0246	1.7356
7-8	7	171	37	0	0.0425	0.0014	0.0152	3.1570
8-9	8	134	52	0	0.0121	0.0000	0.0084	4.4098
>9	9	82	80	2	0.0121	0.0000	0.0084	4.4098
Total			240	37				

Figure 2

Figure 1: Survival curve showing survival probability for duration of exclusive breastfeeding



Exclusive breastfeeding duration was divided into monthly time interval (table 1, col.1). Those women who were giving EBF to their child at start of a given time interval were shown in col.3, those women who had terminated EBF in a given time interval were shown in col.4 and women continuing EBF in that interval was given in col. 5 of table 1. Maximum numbers of terminal events were occurred during 5 to 6 months and again after 8 months of age.

The median duration of exclusive breastfeeding for observed data was obtained as 6 months. Probability of those survived EBF at the beginning of a given time interval will survive to the end of that interval is shown in col.6. Survival to any time point is calculated as the product of conditional probabilities of surviving each time interval. Value shown for 5 to 6 months interval in col.7 (0.19) is the probability that a woman will survive (remain in EBF) by end of this time interval. This value is obtained from col.6 as for the interval of 5 to 6 months: $0.3254 * 0.7681 * 0.8683 * 0.9346 * 0.9711 * 1.0000 = 0.1969$. So col.6 and col.7 are important indicators of survival prospects of women. The survival probability of EBF is gradually decreasing with the increase in time interval (figure 1) and it is maximum between 4-5 and 5-6 months interval. Hazard rate is shown in col.9 is the probability per unit time that a woman who is EBF at the beginning of an interval will experience terminal event (means discontinue EBF) in that interval. It shows increasing trend as the time interval increases.

Figure 3

Table 2: Survival analysis as per type of breastfeeding

Exclusive breastfeeding	Number (n=277)	No. of terminal events	No. of censored cases	Median Survival time (months) SE (95%CI)	Log Rank Test for comparison of groups
On demand	216 (80%)	189	27	6 ± 0.14 (5.85, 6.14)	$p > 0.05$
At fixed time	61 (20%)	51	10	6 ± 0.25 (5.74, 6.25)	

These 277 women were further divided into two groups, one with those feeding on demand and other feeding at fixed time for the child. Table 2 shows that 80% women reported on demand breastfeeding and 20% at fixed time. Median duration of breastfeeding observed 6 months for both on demand and fixed time breastfeeding. However, log rank test was not found statistically significant ($p > 0.05$) for testing differences in survival (EBF duration) of two groups.

Figure 4

Table 3: Survival analysis of other factors associated with exclusive breastfeeding

Exclusive breastfeeding	Number (n=277)	No. of terminal events	No. of censored cases	Median Survival time (months) SE (95% CI)	Log Rank Test for comparison of groups
a) Maternal Education					
Illiterate	105 (38%)	85	20	7 ± 0.43 (6.56, 7.43)	p < 0.05
Literate	172 (62%)	155	17	6 ± 0.11 (5.88, 6.11)	
b) Type of family					
Nuclear	199 (71.8%)	167	32	6 ± 0.16 (5.83, 6.16)	p > 0.05
Joint	78 (28.2%)	73	5	6 ± 0.19 (5.80, 6.19)	
c) Family Income					
Low income group	144 (52 %)	128	16	6 ± 0.22 (5.77, 6.22)	p < 0.05
Middle or high income group	133 (48%)	112	21	6 ± 0.13 (5.86, 6.13)	

Other factors associated with breastfeeding analyzed by survival analysis shown in table 3. It was found that 62% mothers were literate while 38% were illiterate. Median duration of EBF was found more (7 months) for illiterate women than for literate (6 months) and found statistically significant ($p < 0.05$). Exclusive breastfeeding was more common in nuclear family (72%) than in the joint family (28%). Median duration of EBF was found six month in both nuclear and joint family. On testing equality of survival prospects for duration of EBF as per type of family, log rank test was not found statistically significant ($p > 0.05$). Similarly, six month median duration of EBF was found in both lower and middle or high income group but statistically significant difference was observed while testing these two groups.

DISCUSSION

Survival analysis method was used to analyze 277 mothers. The median duration of EBF was 6 months, while in

National Family Health Survey (NFHS) 2 in India; median duration of EBF was 5.3 months. The duration of EBF was shorter in urban educated women from high income group and those who had delivered in health facility (9). Estimates obtained in this study are comparable with those reported by NFHS 2. Giashuddin MS and Kabir M (10) in their study in Bangladesh have reported median duration of EBF as 3.67 months, which is very much less than that of present study. At the beginning of first interval, the hazard of discontinuation of EBF was zero, i.e. $h(t=0) = 0$. There were 277 mothers at risk during the first interval and nobody discontinued EBF during this first interval. As the time interval increases hazard rate also increases. Hazard rate increases rapidly after 6 months. It means that in most of the infants something in addition to breast milk is being added after the age of 6 months.

Survival experiences of two groups namely, those giving exclusive breastfeeding on demand and those giving at fixed time was determined. The median duration of EBF was observed 6 months for women feeding on demand and those feeding at fixed time; however, the difference was statistically not significant. Similar findings were observed by Singh G (11) in their study of breastfeeding.

In developing countries, higher education was found to be associated with shorter duration of EBF (12). In present study, the median duration of breastfeeding was observed high in illiterates than in literates and it was statistically significant. Similar findings were observed by Won JH et al (13) and Kirsten BS et al (14) in their study that higher the mother's education, shorter is the EBF duration. When survival prospects as per type of family was analyzed, median duration of EBF was found 6 months for both nuclear family and joint family which was statistically not significant.

Economic status whether affects the duration of EBF was also analyzed. To determine whether the duration of EBF is related with monthly family income, the survival experiences of two groups were compared. The median duration of EBF was observed same (6 months) for mothers of lower family income and for those having higher income. The difference was statistically significant. Giashuddin MS et al (10) reported that children born in high economic status families had higher risk of stopping exclusive breastfeeding compared to those in low economic status families.

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