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Factors Associated with Breastfeeding Duration: A 30-Month Cohort Study in Northwest China

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Abstract

Background: Factors associated with breastfeeding need to be explored in the northwest of China.
Objective: This study aimed to measure the full duration of breastfeeding and identify factors associated with breastfeeding in Shihezi City in Northwest China.
Methods: A prospective cohort study was undertaken to obtain details of child feeding practices using structured questionnaires in 2007-2010. Before discharge from hospitals, 681 mothers were randomly recruited and interviewed in maternity units for breastfeeding. After discharge, the mothers were contacted by telephone at monthly intervals within the first 6 months and then at 2-month intervals until discontinuation of breastfeeding.
Results: The breastfeeding initiation rate was 95.9%. The breastfeeding rates then declined to 69.6% at 6 months, 29.7% at 12 months, and 2.3% at 24 months. The median duration of "any breastfeeding" was 9 months. The exclusive breastfeeding rate was low because of the high rate of prelacteal and early complementary feeding. Cox regression analyses revealed that mothers who had preterm babies believed that breast milk could not meet infants' needs and intended to breastfeed for less than 6 months, and mothers with late onset of lactogenesis II and whose parents lived in Xinjiang were more likely to stop breastfeeding. Younger maternal age, employment, and suffering from illness were also associated with a shorter duration of breastfeeding.
Conclusion: The duration of "exclusive" and "any breastfeeding" was below the Chinese and World Health Organization breastfeeding goals. Shorter duration of breastfeeding was associated with having grandparents residing within the same province, maternal age, illness and employment, gestational age, and delayed onset of lactogenesis.

Keywords

breastfeeding, breastfeeding duration, China, cohort study, grandparents

Well Established

The National Program of Action for Child Development in China promotes "exclusive breastfeeding" to 4 or 6 months, but actual rates fall short of these targets. China has a high rate of prelacteal feeds and a mean duration of any breastfeeding of between 7 and 9 months.

Newly Expressed

In Xinjiang Province, when the infant's grandparents lived within the same province, breastfeeding duration was reduced. When a mother returned to work, infants were commonly sent to the grandparents for care and were no longer breastfed.

Background

The World Health Organization (WHO) recommends that infants are exclusively breastfed for the first 6 months after birth with breastfeeding continuing with appropriate nutritious complementary foods for 2 years of age or longer.[1] Breastfeeding brings both short-term and long-term health

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benefits to babies and mothers, including reducing mortality from infectious diseases.[1,2] The Dietary Guidelines for Chinese Children aged 0 to 6 years were updated in 2007 and are consistent with the WHO breastfeeding recommendations.[3] However, breastfeeding rates in China, particularly exclusive breastfeeding rates, have not yet reached national and international targets.[3]

Shihezi is a medium-sized city situated in the Xinjiang Uygur Autonomous Region in the far northwest of the Peoples' Republic of China, with a population of approximately 335 600 at the end of 2008. The population of Shihezi is predominantly Han ethnic Chinese (93%), whereas the surrounding regional areas contain a higher proportion (approximately 50%) of minority groups.

To date, the duration of follow-up for most reported prospective breastfeeding cohort studies in China has been 12 months or less, and in Xinjiang Province, there are no studies for longer than 6 months.[3] Xu et al reported that "any breastfeeding" rates were 76% to 78% at 6 months in Shihezi between 1994 and 2004.[4] Previous cohort studies have been too short to document breastfeeding duration to completion and the factors associated with longer duration.

The aim of this cohort study was to measure the completed duration of breastfeeding and examine factors associated with "any breastfeeding" duration in Shihezi City from 2007 to 2010.

Methods

Study Setting and Participants

A prospective cohort study of infant and child feeding practices was performed in 2007-2010 (n = 681) in Shihezi, China. Mothers were randomly recruited from 2 major hospitals and 1 maternal and child health care institute located in urban areas. The Shihezi People's Hospital, the First Affiliated Hospital of the Medical College of Shihezi University, and Shihezi Maternal and Child Health Care Institute are all Baby-Friendly Hospital Initiative accredited. Each week, 1 or 2 days were randomly selected as interview dates and all mothers with singleton births on the selected days were invited to participate in the study. Mothers or their babies with illnesses that required admission to neonatal intensive care units were excluded from the study. The two hospitals and the institute included in the study include about 90% of births in Shihezi City. During the period October 1, 2007, to September 30, 2008, in Shihezi City, 1659 mothers gave birth in Shihezi City and 1493 mothers delivered their babies in the 2 hospitals and the institute.

Questionnaires and Interview

The structured questionnaires for this study have been extensively used in breastfeeding cohort studies in Australia, Vietnam, Kenya, and China.[4-8] The questionnaires were translated into Chinese and were then tested in focus groups to ensure cultural appropriateness. Shihezi is a predominantly Han ethnic area, so all participants, including members of minority groups, could read Chinese and speak Mandarin.

Mothers (712) who delivered babies during the study period in the hospitals and institute were invited to participate in the study. A total of 681 mothers agreed to participate, a response rate of 95.6% (681/712). Baseline information was collected in the maternity wards by an interviewer-administered questionnaire that included questions on infant feeding practices, demographic characteristics, lifestyle, health-related and social-psychological factors, intentions and perceptions about infant feeding, and preferred contact methods. In the first interview, all mothers who agreed to participate in the study were also asked to provide the numbers of their mobile and/or their family landline. After discharge, mothers were interviewed by telephone using the follow-up questionnaires, which included feeding practices, types and time of introduction of complementary food, and reasons for cessation of breastfeeding, at approximately monthly intervals for the first 6 months (0.5, 1.5, 2.5, 3.5, 4.5, and 6 months), and then at 2-month intervals until the infant reached 12 months of age. After 12 months, mothers who were still breastfeeding were contacted at 2-month intervals until the final mother ceased breastfeeding at 30 months. The baseline interview took about 30 minutes and each follow-up interview around 10 minutes.

All the interviews were undertaken by the lead authors using a standard protocol. The study was approved by the Science and Technology Committee of Shihezi University, China, and the Human Research Ethics Committee of Curtin University, Australia.

Statistical Analysis

All data analyses were conducted using IBM SPSS Statistics, version 19.[9] Descriptive statistics were generated for demographic factors. Life tables and Kaplan-Meier methods were used to calculate breastfeeding rates and durations, respectively. Cox regression analyses were performed to identify the factors associated with discontinuation of any breastfeeding. There were 18 variables included in the multivariate Cox regression models in total. The final model was constructed using factors that had an association with breastfeeding duration based on the univariate association (the level of significance was set at $P < .05$) or had been identified from other Chinese studies.[3-5,8]

The variables included in the multivariate Cox regression models were mother's age (years), education (years), employment (housewife, sales, worker, office worker, other), time of making decision about infant feeding method (after delivery, during pregnancy, before pregnancy), mother's intention on feeding method (exclusive breastfeeding, breast milk plus water, breast milk plus other food, no breast milk), whether mother was breastfed herself (yes, no), infant

father's feeding preference (breastfeeding, formula feeding), gestational age (< 37, ≥ 37 weeks), delivery mode (vaginal, cesarean), perception of "insufficient breast milk supply" within 1st week postpartum (yes, don't know, no), how long mother intended to breastfeed (≤ 6, 6.1-10, > 10 months, unknown), mother's perceptions about continuing breastfeeding after returning to workplace (cannot, can, not employed), baby's gender (male, female), using pacifier within 2 weeks (yes, no), when mothers planned to start adding supplemental food (continuous variable, months), mother's illness during follow-up period (yes, no), and child's illness during follow-up (yes, no).

In this study, *any breastfeeding* refers to an infant receiving breast milk with or without any other drink, formula, or other infant food. An infant who is *exclusively breastfed* receives only breast milk with the exception of drops or syrups consisting of vitamins, mineral supplements, or medications.[10]

Results

The demographic and social characteristics of the study sample are shown in Table 1, which also provides details of mothers who breastfed for less than 12 months compared to those who breastfed for 12 months or longer. In the 30-month follow-up period, there were 42 (6.2%) mothers who were lost at follow-up. All mothers had ceased breastfeeding at 30 months.

Figure 1 shows a survival curve for exclusive breastfeeding and any breastfeeding rates. The breastfeeding initiation rate was 95.9% (653/681), and 26.2% of mothers (159/606 with 75 cases missing) initiated breastfeeding within the first hour after birth. The any breastfeeding rates were 89.4%, 82.1%, and 69.6% at 1, 3, and 6 months, respectively, and 29.7%, 7.9%, and 2.3% at 12, 18, and 24 months, respectively. The median duration of any breastfeeding was 9 months (inter-quartile range of 5 to 12.5) months. The exclusive breastfeeding rates at 1, 3, and 6 months were 22.0%, 17.3%, and 2.6%, respectively, because of the high rate of prelacteal and early complementary feeds.

Table 2 shows the factors associated with the cessation of any breastfeeding (n = 653). Mothers who had preterm births, who considered that breast milk could not meet the baby's needs within the first week after birth, who intended to breastfeed for less than 6 months, who had delayed breast milk onset, and whose parents (ie, the infant's grandparents) lived in Xinjiang had shorter breastfeeding duration. Mothers who were younger, who were employed, or who became ill had a shorter duration of breastfeeding.

Discussion

This is the first study to follow a cohort of breastfeeding mothers in the northwest of China until all infants had stopped breastfeeding. Grandparents' support was generally found to have a negative association with the continuation of breastfeeding. Approximately one third of the mothers had stopped breastfeeding by 6 months and another third by 12 months (see Figure 1). The rate of decline then slowed during the second year of life. The median duration of any breastfeeding in Shihezi was 9 months, which was similar to other cities and provinces in China.[3] The any breastfeeding rates at 6 months were the same as in the 2003-2004 Shihezi study.[4]

The exclusive breastfeeding rate was only 24.2% at 14 days and 2.6% at 6 months after birth. The early introduction of (sugar) water and/or infant formula to babies is very common in Shihezi and Xinjiang. The use of prelacteal feeds is very high.

The factors associated with any breastfeeding duration included preterm birth. Preterm babies have more health problems than term babies and, as expected, this study showed that preterm babies were more likely to be separated from mothers for special treatment and care. Most of these infants were fed with formula rather than breast milk. This study also showed that breastfeeding continuation was positively associated with early breast milk onset, a result similar to other studies in China and other developing countries.[3,11] Early initiation of breastfeeding in the hospital is associated with longer duration of any breastfeeding.

Consistent with previous studies, mother's age was positively associated with breastfeeding duration.[12-14] This study showed that the percentage of mothers who had more than 1 child (including the current birth) was only 3% in mothers younger than 30 years old, 8% in mothers aged between 30 and 34, and 27% in mothers aged 35 and older ($P < .01$), reflecting China's 1 child policy.

Insufficient milk supply (including perceived milk insufficiency) is a common reason for stopping breastfeeding or for providing supplementary feeds to infants and was found to be a significant factor in this study (see Table 2).[15] Perceived milk insufficiency is more common among mothers whose babies were younger than 6 months of age,[16] although physiological studies have suggested that only 1% to 5% of women have genuine problems with milk production and supply.[17] The incidence of perceived milk insufficiency decreased significantly after information on breastfeeding techniques had been taught, although there have been no similar studies in China.[3,18] In this study, mothers who intended to breastfeed longer were more likely to breastfeed their babies, and the mothers' perception and intention for breastfeeding at an early stage after birth predicted the duration of breastfeeding.

Maternal employment status and whether their parents (ie, infant's grandparents) were living in Xinjiang Province were associated with any breastfeeding duration. Returning to work is one of the more important reasons for mothers to stop breastfeeding.[19] The study showed that mothers who could not breastfeed at their workplace due to work hours or lack of facilities were less likely to breastfeed their babies.

Table 1. Demographic Details of Mothers' Breastfeeding for > 12 Months and ≤ 12 Months[a]

Variable	Total	Breastfeeding > 12 Months (n = 191)	Breastfeeding ≤ 12 Months (n = 448)	*P* Value
Mother's age, y		30.6 ± 4.0	29.7 ± 4.0	.01
19-24	51 (8.0)	11 (5.8)	40 (8.9)	
25-29	257 (40.3)	66 (34.6)	191 (42.7)	
30-34	240 (37.6)	79 (41.4)	161 (36.0)	
35-45	90 (14.1)	35 (18.3)	55 (12.3)	
Missing value	1			
Mother's education, y		13.0 ± 3.3	13.6 ± 3.2	.03
≤ 9	106 (16.8)	43 (23.0)	63 (14.2)	
10-12	158 (25.0)	47 (25.1)	111 (24.9)	
≥ 13	368 (58.2)	97 (51.9)	271 (60.9)	
Missing values	7			
Mother's occupation				
Housewife	171 (26.8)	54 (28.3)	117 (26.2)	.54
Sales	154 (24.1)	48 (25.1)	106 (23.7)	
Worker	103 (16.1)	29 (15.2)	74 (16.6)	
Office worker	184 (28.8)	56 (29.3)	128 (28.6)	
Other	26 (4.1)	4 (2.1)	22 (4.9)	
Missing value	1			
Mother's parents in Xinjiang				
No	529 (84.1)	41 (21.9)	59 (13.3)	.01
Yes	100 (15.9)	146 (78.1)	383 (86.7)	
Missing values	10			
Birth weight, g		3505.7 ± 447.7	3451.7 ± 447.0	.16
< 2500	5 (0.8)	1 (0.5)	4 (0.9)	
2500-3999	542 (85)	159 (83.2)	383 (85.7)	
≥ 4000	91 (14.3)	31 (16.2)	60 (13.4)	
Missing value	1			
Baby's gender				
Male	322 (50.5)	97 (50.8)	225 (50.4)	.94
Female	315 (49.5)	94 (49.2)	221 (49.6)	
Missing values	2			
Gestational age at birth, wk				
< 37	18 (2.8)	2 (1.0)	16 (3.6)	.08
≥ 37	621 (97.2)	189 (99.0)	432 (96.4)	
Delivery method				
Vaginal	125 (19.6)	50 (26.2)	75 (16.8)	.01
Cesarean	513 (80.4)	141 (73.8)	372 (83.2)	
Missing value	1			
Mother's intention of feeding method				
Exclusive breastfeeding	370 (57.9)	116 (60.7)	254 (56.7)	.04
Breast milk + water	204 (31.9)	65 (34.0)	139 (31.0)	
Breast milk + other food	47 (7.4)	9 (4.7)	38 (8.5)	
No breast milk	18 (2.8)	1 (0.5)	17 (3.8)	
Time of making decision about infant feeding method				
After baby born	149 (23.3)	35 (18.3)	114 (25.4)	.14
During pregnancy	218 (34.1)	68 (35.6)	150 (33.5)	
Before pregnancy	272 (42.6)	88 (46.1)	184 (41.1)	
Whether mother was breastfed				
No	26 (4.2)	4 (2.1)	22 (5.0)	.10
Yes	600 (95.8)	183 (97.9)	417 (95.0)	
Missing values	13			

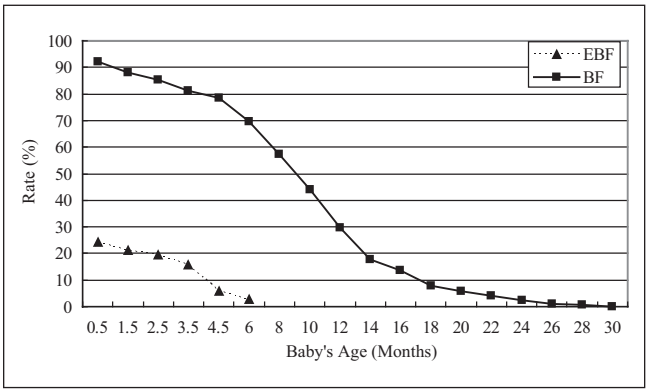
(continued)

Table 1. (continued)

Variable	Total	Breastfeeding > 12 Months (n = 191)	Breastfeeding ≤ 12 Months (n = 448)	*P* Value
Perception of insufficient breast milk supply				
No	333 (53.5)	124 (65.6)	209 (48.3)	< .001
Yes	183 (29.4)	40 (21.2)	143 (33.0)	
Don't know	106 (17)	25 (13.2)	81 (18.7)	
Missing values	17			
How long mother intended to breastfeed, mo				
≤ 6	199 (32.8)	44 (23.5)	155 (37.0)	< .001
6.1-10	181 (29.9)	51 (27.3)	130 (31.0)	
> 10	226 (37.3)	92 (49.2)	134 (32.0)	
Missing values	33			
When mothers planned to start adding supplemental food, mo				
< 4	108 (17.2)	30 (15.9)	78 (17.7)	.04
4-5	285 (45.3)	71 (37.6)	214 (48.6)	
6	141 (22.4)	52 (27.5)	89 (20.2)	
> 6	38 (6.0)	16 (8.5)	22 (5.0)	
Don't know	57 (9.1)	20 (10.6)	37 (8.4)	
Missing values	10			
Can mother continue breastfeeding after returning to workplace?				
Not employed	117 (19.1)	48 (25.4)	79 (18.6)	< .001
Can	370 (60.3)	124 (65.6)	246 (57.9)	
Cannot	127 (20.7)	17 (9.0)	100 (23.5)	
Missing values	25			

[a]Values expressed as mean ± SD or No. (%). Two-sided *t* test for continuous variables and χ^2 test for categorical variables. Forty-two out of 681 mothers were censored within the first 12 months.

Figure 1. Survival Curves for Exclusive and Any Breastfeeding Rates (%) in Shihezi, China, 2007-2010



Abbreviations: EBF, exclusive breastfeeding; BF, breastfeeding.

The statutory maternity leave for most employed mothers in this study was 4 or 4.5 months. The breastfeeding rate declined very significantly at 4 months after birth, and returning to work by mothers was an important factor in this.

In China, many children are cared for by their grandparents while both parents work. Often, grandparents may live in a different location from the mother and her baby, for example, the grandparents may live in a rural village while the mother has employment in a city. In this situation, it is common for mothers who return to work to give up breastfeeding and let their babies stay with their grandparents.[20] The Xinjiang Uygur Autonomous Region is located in the very west of China and it generally takes 2 days' train travel (48 hours, 2500 kilometers) to reach central China, where many residents of Xinjiang originate. If the babies' grandparents lived in provinces other than Xinjiang, their parents were less likely to let the grandparents take care of their infants because of the long distances involved. However, if grandparents lived in the Xinjiang Region, it was more likely that the baby would be sent to the grandparents for care and hence be less likely to be breastfed. Shihezi is a relatively young city, and if infants were sent to their grandparents, they would live in their grandparents' home and their parents would visit them regularly.

The strengths of this study include that the mothers were followed up for the entire breastfeeding period and that the number of participants lost to follow-up was low (8%). Mothers were followed up at monthly intervals for the first 6 months and then at 2-month intervals to minimize recall bias.

Table 2. Factors Associated with Cessation of "Any Breastfeeding" in Shihezi, China, 2007-2010[a]

Variable	n	Adjusted HR	95% CI	
			Lower	Upper
Gestational age at birth, wk				
≥ 37	583	1.0		
< 37	16	1.94	1.15	3.28
Perception of insufficient breast milk supply				
No	332	1.0		
Yes	171	1.66	1.35	2.03
Don't know	96	1.25	0.99	1.60
How long mother intended to breastfeed, mo				
> 10	176	1.0		
6.1-10	181	1.50	1.19	1.89
≤ 6	183	1.59	1.26	1.99
Unknown	59	1.42	1.02	1.96
Can mother continue breastfeeding after returning to workplace?				
Not employed	118	1.0		
Can	376	1.35	1.08	1.70
Cannot	105	1.82	1.36	2.43
Mother's age				
35-45	77	1.0		
30-34	218	1.42	1.06	1.90
25-29	235	1.48	1.10	2.00
19-24	44	1.81	1.18	2.79
Mother's illness during the follow-up period				
No	555	1.0		
Yes	44	1.51	1.11	2.07
When breast milk "came in" postpartum				
1 day	75	1.0		
2 days	172	1.07	0.80	1.43
3 days	252	1.40	1.06	1.84
≥ 4 days	41	1.80	1.19	2.72
No breast milk at time of survey	42	1.41	0.92	2.16
Mother's parents in Xinjiang				
No	92	1.0		
Yes	498	1.40	1.09	1.79

Abbreviation: HR, hazard ratio; CI, confidence interval.
[a]All 18 variables listed in the Methods section were included in the final model.

There are some limitations that need to be considered when interpreting the results of this study. The data collected were from only 3 hospitals in Shihezi City where the majority of residents were Han Chinese. This sample is representative of the Han Chinese population in Shihezi City but cannot necessarily be generalized to minority areas in other parts of Xinjiang Province.

Conclusion

The duration of exclusive and any breastfeeding in Shihezi was below the WHO breastfeeding goals. Although many of the factors associated with breastfeeding duration have been previously identified in China, we have not found other studies that have identified a similar role for grandparents. Further research is needed to confirm this relationship in other locations in China. In the design of future interventions to extend the duration of exclusive and any breastfeeding, education for grandparents about the importance of breastfeeding for infant health and development should be included. This should be in addition to the other factors that have been confirmed as being associated with breastfeeding duration in this study.

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Declaration of Conflicting Interests

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