Original Article

Introduction of complementary foods to infants within the first six months postpartum in Xinjiang, PR China

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The aim of this study was to document the introduction rates of complementary foods to infants in the Han, Uygur and other ethnic groups living in the Xinjiang Uygur Autonomous Region, PR China. A longitudinal study of infant feeding practices was undertaken using a random sample that included all of the ethnic groups in the region. Mothers were randomly recruited and interviewed in hospitals and maternal and child health institutes in the region. A total of 1219 mothers (578 Han, 360 Uygur and 281 from 'other minority' groups), who delivered babies during 2003 and 2004, were recruited. After discharge they were contacted at approximately monthly intervals during the first six months of their infant's life to obtain details of feeding practices. The overall introduction rates of water, cow's milk and solid food in Xinjiang were, respectively, 23%, 2% and 6% before discharge and 76%, 39% and 78% at six months. The rates were different between ethnic groups. Uygur mothers were most likely to feed water to their babies, with introduction rates of 57% before discharge and 95% at six months, while the corresponding rates were 6% and 77% for Han and 12% and 52% for other minority groups. Mothers from Uygur and other minorities introduced cow's milk earlier than Han mothers. Uygur mothers also introduce solid foods earlier (10% pre discharge and 91% by six months) when compared to Han (3% pre discharge and 85% by six months) and other minorities (4% pre discharge and 48% by six months). The pattern of introduction of complementary foods in this region does not follow internationally recognized practices, suggesting the need for further education of health professionals and parents.

Key Words: complementary foods, breastfeeding, ethnic groups, Xinjiang Uygur AR, China

Introduction

Breastmilk provides the basis for the best nutrition for infants and brings health and development benefits to both babies and mothers.[1,2] The World Health Organization expert consultation recommended that 'exclusive breastfeeding' for the first six months of life, then introduction of complementary foods and continued breastfeeding thereafter.[3] Timely introduction of appropriate complementary foods promotes good health, nutritional status and growth of infants and young children.[4] In Vietnam a cohort study of infants found that the early introduction of complementary foods resulted in a slowing of growth.[5] Complementary foods may introduce infections into the gastrointestinal tract and reduce absorption and in addition the micronutrients in complementary foods are not as well absorbed as those in breastmilk.[6]

Over the past forty years, China has experienced considerable changes in breastfeeding practices. In the 1950's and 1960's, 'ever breastfed' rates in both urban and rural areas were over 80%, but during the 1970's, the rates declined and remained lower for a decade or more than 10 year as the availability and use of breastmilk substitutes increased.[7,8] A survey undertaken in 20 provinces in 1984 showed that breastfeeding rates at four and six months were 42.5% and 34.4% in urban areas and 69.9% and 60.3% in rural areas.[9] The Chinese government set a national target of an 'exclusive breastfeeding' rate at four months of 80% by 2000 in the Chinese Children's Development Plan in 1990's and the breastfeeding rate began to increase in 1990's.[10,11] While exclusive breastfeeding is important, after six months it is also important that nutrient dense complementary foods are introduced.[12]

By 2000 breastfeeding initiation rates in many parts of China were as high as 90%, but 'exclusive breastfeeding' rates were low in most places and few achieved the national target.[13,14] The same national survey showed that in rural areas more than one third babies were fed complementary food in the first few months of life.[13]

The Xinjiang Uygur Autonomous Region in Northwestern China borders eight countries: Russia, Kazakhstan, Kirghizstan, Tajikistan, Pakistan, Mongolia, India and Afghanistan and has more than 13 ethnic groups. The overall population of China is 1.3 billion, 92% are Han Chinese and the remaining 8% are a large number of smaller ethnic groups.

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In the Xinjiang Province, with 19.6 million people, the Uygurs account for 46%, Han 40% and Kazakh 7%, with the remainder from 10 other ethnic groups.[15] The birth rate in the region was 16 per thousand and the death rate 5.1 per thousand in 2002.

The only published infant feeding research report from this region was a cross-sectional survey of rural China and included little information about complementary food introduction in Xinjiang.[13] While no details of complementary food introduction were given in this report, babies from ethnic minority groups were least likely to be 'exclusive breastfed'. The 'exclusive breastfeeding' rate at four months for this region was only 10%, well below Chinese and international targets.[13] The objective of this paper was to document the introduction rates of complementary foods to infants under six months of age, including water, cow's milk and solid food. The study includes infants from the Han, Uygur and other ethnic groups living in the Xinjiang Uygur Autonomous Region. Knowledge of complementary feeding practices would allow the development of appropriate health promotion programs to achieve the Chinese government's infant feeding targets.[11]

Methods

A longitudinal cohort study of infant feeding practices was undertaken in the Xinjiang Uygur Autonomous Region, PR China. Mothers who delivered babies during 2003 and 2004 were interviewed while in hospital and were invited to participate in the study. After their return home mothers were contacted in person or by telephone at approximately monthly intervals (at 0.5, 1.5, 2.5, 3.5, 4.5 and 6 months respectively) and asked to complete a structured questionnaire on their current feeding practices.

A total of 1256 mothers were randomly recruited from five hospitals and institutes located in urban areas (Shihezi People's Hospital, Shihezi Maternal and Child Health Care Institute, Urumqi Maternal and Child Health

Table 1. Percentage of infants given water and complementary food at six months postpartum, Xinjiang, PR China, 2003-2004 (n=1219)

Variable	Value	n	Water (%)	Cow's Milk (%)	Solid food (%)
Place	Urban Area	909	88.8**	34.8**	90.0**
	Rural Area	310	44.4	48.7	46.6
Birth Weight	<2500g	37	96.3**	54.4	88.1**
	2500-3999g	1019	75.1	37.3	76.8
	4000g+	112	83.8	44.0	90.4
Delivery Method	Vaginal Delivery	618	71.3	40.1	71.3**
	Caesarean	537	83.6	36.9	88.6
Parity	Primiparous	924	77.7	38.1	79.8
	Multiparous	199	72.9	39.3	75.8
Baby's Gender	Male	616	75.3	40.3	78.7
	Female	561	77.9	35.4	77.5
Maternal Job	Farmer	95	67.9*	34.3	65.7**
	House Wife	500	70.3	39.7	72.1
	Sales	155	78.8	32.7	88.4
	Office Worker	249	82.9	42.1	81.6
	Worker	119	87.4	37.0	92.4
Maternal Age	<25	184	77.8	42.3	72.0*
	25-29	544	75.8	37.6	78.8
	30+	373	76.0	37.1	80.9
Maternal Education Year	< 9	476	68.0**	37.2	71.2**
	10-12	305	76.3	37.9	79.2
	13+	355	86.5	39.7	86.3
Family Annual Income (RMB)	<10000	309	64.7**	40.5	64.7**
	10000-19999	356	78.1	37.0	81.8
	20000+	258	86.8	40.6	88.2

*p<0.05, ** p<0.01

Table 2. Introduction rates of water and complementary foods in Han, Uygur and Other Ethnic Groups, Xinjiang, PR China, 2003-2004 (n=1219)

	Month	Uygur		Han		Others		Overall
		Rate (%)	CI	Rate (%)	CI	Rate (%)	CI	%
Water	0† **	56.8	51.7-61.9	6.1	4.1-8.1	11.9	8.1-15.7	22.7
	0.5*	73.1	68.3-77.9	20.2	16.6-23.8	22.5	17.5-27.5	36.7
	1.5**	90.9	87.8-94	45.4	40.9-49.9	29.2	23.7-34.7	55.1
	2.5**	92.2	89.3-95.1	50	45.5-54.5	36.2	30.4-42	59.3
	3.5**	92.5	89.6-95.4	54.9	50.3-59.5	39.1	33.2-45	62.3
	4.5**	93.7	91.1-96.6	70	65.8-74.2	44.7	38.7-50.7	70.7
	6**	95.3	92.9-97.7	76.9	72.9-80.9	52.3	46.3-58.3	76.2
Cow's Milk	0†	2	0.6-3.4	0.9	0.1-1.7	3.6	1.4-5.8	1.9
	0.5*	4.1	2-6.2	2.8	1.3-4.3	11.7	7.9-15.5	5.4
	1.5*	4.7	2.4-7	4	2.2-5.8	12.8	8.8-16.8	6.4
	2.5*	7.4	4.5-10.3	6.2	4-8.4	17.6	13-22.2	9.4
	3.5*	16.6	12.5-20.7	8.8	6.2-11.4	22.1	17.1-27.1	14.5
	4.5*	20.4	16-24.8	14	10.8-17.2	31.7	26.1-37.3	20.4
	6*	45.2	39.7-50.7	25.9	21.8-30	52	46-58	38.8
Solid Food	0.5*	10.1	6.9-13.3	3.1	1.5-4.7	4.4	1.9-6.9	5.6
	1.5*	23.2	18.6-27.8	5	3-7	6.7	3.7-9.7	11
	2.5*	50.9	45.5-56.3	10.5	7.7-13.3	15.6	11.2-20	24.2
	3.5*	67.6	62.5-72.7	29.2	25-33.4	22	17-27	39.2
	4.5**	85.4	81.5-89.3	70.6	66.4-74.8	34	28.3-39.7	65.8
	6**	90.5	87.2-93.8	85.1	81.7-88.5	48	42-54	77.6

† 0 month refers to the time at discharge from hospital, which was generally in one week postpartum. * significant differences (confidence intervals are not overlapped) at least between two groups. ** significant differences between each group. CI – 95% confidence interval

Care Institute) and rural areas (Chabuchaer Maternal and Child Health Care Institute and Yumin County Hospital) of the region. Almost all of the mothers (1219) agreed to participate, a response rate of 97%. Urumqi is the capital city of Xinjiang where the Uygur ethnic group is in the majority, while Shihezi is a predominantly Han ethnic area. Chabuchaer and Yumin counties have a larger concentration of Kazakh people and other minorities.[15]

The questionnaire was originally prepared in Mandarin, and was translated into the Uygur language, which can also be understood by Kazakh mothers. For all minority mothers, interviews were in their own language by nurses from their own ethnic group. The questionnaire was based on those that have been extensively used in infant feeding cohort studies in Australia, Vietnam and Kenya.[16-21] After translation the questionnaires were tested in focus groups to ensure cultural appropriateness and modified where necessary.

The project was approved by the Shihezi University and Urumqi Science Research Committees and the Human Research Ethics Committee of Curtin University, Australia. Mothers who agreed to participate in the study signed the consent page in front of the questionnaire and were informed of their rights to withdraw from the follow up process at anytime without prejudice. All data collected was kept confidential.

The data analyses were carried out using the Statistical Package for Social Science (SPSS), release 12.0 (SPSS Inc., Chicago, IL, USA). Life table analysis was used to calculate the introduction rates of water, cow's milk and solid food and assess the differences between the demographic groups. The definitions of breastfeeding used in this paper are:[22,23] 'Any breastfeeding': The child has received breastmilk (direct from the breast or expressed) with or without other drink, formula or other infant food.

Complementary food: any food that is suitable as a complement to breastmilk or infant formula when either becomes insufficient to satisfy an infant's nutritional requirements. Such food is also commonly called weaning food or breastmilk supplement.[22]

Solid food: any nutrient-containing foods (semi-solid or solid), eg dilute infant cereals. This does not include breastmilk or breastmilk substitutes, fruit and vegetable juices, sugar water, etc.[24]

Results and discussion

The sample of 1219 mothers and their infants included 47% (578) Han, 30% (360) Uygur and 23% (281) from other minority ethnic groups. The other ethnic groups (n=281), included 199 Kazakh babies, 56 Xibe babies and 26 Hui babies, groups that were too small for separate analysis. Almost all of the mothers in the study were

married, with eight separated and one widowed. Follow-up of mothers in the study was relatively good and data is available for 84.5% of the possible "infant-months".

The details of the rates of infants' use of water, cow's milk and solid food at six months postpartum in the different demographic groups are shown in Table 1. Factors that favoured the introduction of water before 6 months were 'infants living in urban areas', 'low birth weight', 'mothers with more education' and a higher family income'. Mothers who were workers (a category referring to an intermediate level of skill) or office workers were more likely to introduce water earlier than mothers whose employment was given as farmer, housewife or salesperson. Factors that were found to be not significant included delivery method, parity, baby's gender and maternal age.

For the introduction of cow's milk before six months, the only significant different factor was place of residence; infants living in rural areas were more likely to have cow's milk than urban infants. The early introduction of solid food was associated with 'living in an urban area', having a birth weight below 2500g or above 4000g, delivery by caesarean section, an older mother and where the mother had more years of education. Low family income infants were less likely to have an early introduction of solid food compared to higher income groups. There were no significant differences in parity or baby's gender.

The breastfeeding initiation rates were 89% in Han, 94% in Uygur and 97% in other ethnic groups and at six months these had declined to 77%, 55% and 88% respectively. The introduction rates of water, cow's milk and solid food in the Uygur, Han and 'other' ethnic groups from life table analysis are detailed in Table 2. The rates of introduction of water, cow's milk and solid food were 23%, 2% and 6% before discharge and 76%, 39% and 78% at six months for each group respectively.

Uygur mothers were more likely to introduce water earlier to their babies and even before discharge 57% of Uygur babies had been given water to drink. The rates in the Han and 'other' ethnic groups were lower at 6% and 12% before discharge. By six months 95% of Uygur, 77% of Han and 52% of the other babies had been given water. A different pattern was shown for the introduction of cow's milk and only a small number of infants had been given cow's milk before discharge, but by six months this had risen to almost 50% in the non-Han ethnic groups. As well as introducing water and cow's milk at an early age, the Uygur mothers also introduced their infants to solid foods at an earlier date than the other ethnic groups. By six months solids were being given to 91%, 85% and 48% of the Uygur, Han and 'Other' ethnic groups respectively.

The recommended pattern of infant feeding is that complementary foods should be introduced at about 6 months of age. While some infants may need complementary foods a little earlier, they should not be given before 4 months of age.[4,25] As this is the first reported longitudinal study of infant feeding in the Xinjiang Uygur Autonomous region there are no previous reports available for comparison.

Uygur mothers were most likely to introduce water and solid food to their babies early. Many Uygur mothers would state: 'breastmilk was not thick enough for baby's growth' as the reason for the early introduction of solids. This result was similar to the studies in Tibet where almost all babies were fed water before 4-6 months.[26] The early introducing of water or complementary foods may lead to shortening of breastfeeding duration and exposes the infant to increased rates of morbidity and mortality.[27]

The early introduction of complementary foods means that, 'exclusive breastfeeding' and 'full breastfeeding' rates are low and their duration was relatively short in all ethnic groups, well below Chinese and international targets.[11,28,29] Inappropriate infant feeding advice given by health professionals may be a factor influencing 'exclusive breastfeeding'. Many doctors believe that infant jaundice is associated with dehydration and so they suggest feeding water to affected infants. In reality an early first breastfeed and frequent breastfeeds with no restrictions help to prevent or reduce jaundice.[30]

The too-early introduction of unmodified cow's milk and milk products is a nutritional risk factor for the development of iron deficiency anaemia and should not be introduced until after nine months or preferably one year.[4] In Xinjiang, the introduction rates of cow's milk were 39% at six months include 26% in Han, 45% in Uygur and 52% in other ethnic groups. This may have an adverse impact on infant nutrition, including increasing the prevalence of micronutrient deficiency.

The main problems identified in this study of infant feeding in the different ethnic groups in Xinjiang were the early introduction of water and complementary foods. Mothers, especially Uygur mothers, need to be educated about the benefits of 'exclusive breastfeeding' in the first six months and taught to introduce water and complementary after that age.

There are several limitations that need to be considered when interpreting the results of the study. The follow-up period in this study was until six months and so the median age of cow's milk and solid food introduction for all ethnic groups could not be determined. However the survival rates at six months still show significant differences between the ethnic groups. Further study is needed to identify factors associated with introduction rates of water and complementary food in different ethnic groups.

The overall introduction rates of water, cow's milk and solid food in Xinjiang were 23%, 2% and 6% before discharge and 76%, 39% and 78% at six months respectively. The rates were different in Uygur, Han and other ethnic groups. Uygur mothers were most likely to feed water and solid food to their babies, Han the second. Han mothers were less likely to feed cow's milk to their babies than minority mothers.

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