Original Article

Determinants of breastfeeding at discharge in rural China

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This study aimed to investigate the rate of breastfeeding at discharge and associated influencing factors in rural China. A prospective cohort study of infant feeding practices was undertaken during 2010-2011 in Jiangyou city, Sichuan Province of China. Logistic regression analysis was performed to ascertain pertinent factors affecting the prevalence of any breastfeeding at discharge. The participants consisted of 695 mothers aged 18-44 years. The breastfeeding rate at discharge was 93.5% (95% CI: 91.7-95.3). Perceived paternal breastfeeding preference was positively associated with actual breastfeeding at discharge (OR=4.46, 95% CI: 2.15-9.28). Other significant determinants were 'receiving breastfeeding support' from staff during hospital stay (OR=3.41, 95% CI: 1.58-7.34) and making the decision on feeding method during pregnancy or after childbirth (OR=0.46, 95% CI: 0.22-0.93). In conclusion, provision of comprehensive breastfeeding support in hospital and education programs targeting expectant and future parents are recommended to further increase the rate of breastfeeding at discharge in rural areas of China.

Key Words: breastfeeding, China, hospital support, paternal attitude, discharge

INTRODUCTION

Breastfeeding is widely acknowledged to be the appropriate feeding method for infants in terms of nutrition, growth and development, and immunology. China experienced a rapid decline in the prevalence of breastfeeding in the late 1970s when infant formula became readily available.[1] In response, the Chinese government introduced the 'Baby Friendly Hospital Initiative' together with the regulation of the marketing of breast milk substitutes in the 1990s. Since then, increases in breastfeeding rates were evident with several studies reporting rates above 90% at discharge.[2,3]

Factors affecting breastfeeding, such as demographics, attitudes and social support, have been extensively investigated in the literature.[4] For Chinese mothers, however, the impact of socioeconomic status is inconsistent, probably due to diverse settings and different methodologies used in various studies.[2,5,6] For example, women with higher education levels were more likely to commence breastfeeding in Taiwan,[7] whereas no significant changes in breastfeeding rate at discharge were observed among mothers with different educational background in remote Xinjiang.[2]

Social support for the mother, either lay or professional support, has been identified as another determinant of breastfeeding in culturally diverse communities.[8,9] Among the sources of social support, "mother's perception of father's preference for breastfeeding" has emerged as a pertinent factor affecting the decision to breastfeed, especially in western countries.[10-12] For Chinese mothers, the limited results concerning paternal preference suggested conflicting evidence. In urban Hangzhou, father's reported attitude towards breastfeeding was not related to breastfeeding at discharge.[13] However, a cross-sectional study from rural Taiwan showed that infants whose fathers were perceived to be supportive of breastfeeding were more likely to be breastfed at discharge, when compared to infants whose fathers were reported to disapprove of breastfeeding or be ambivalent.[14]

Sichuan is a large province in western China with a population of 80 million people who are mainly involved in agriculture. There have been no published cohort studies on infant feeding practices in Sichuan. The aim of this study was to investigate the rate of breastfeeding at discharge and associated influencing factors in rural China.

MATERIALS AND METHODS

A prospective cohort study on infant feeding practices was undertaken during 2010-2011 in Jiangyou, Sichuan

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Province. This study design was adopted to enable an accurate maternal recall of breastfeeding practices. Jiangyou is a county-level city with a population of 880,000 located 160 km north of the provincial capital city Chengdu. The annual per capita income of rural residents in Jiangyou was approximately 960 United States dollars (USD), slightly higher than the average provincial level of 815 USD in 2011, according to the Sichuan Bureau of Statistics. From March to November, 2010, mothers who delivered single "healthy" babies at four hospitals and three township health centres in Jiangyou were invited to participate in this study before discharge. Healthy babies were defined as those who spent less than 4 days in the newborn intensive care unit.[15] In China, township health centres are state-owned institutions that provide primary health care to people living in rural areas.

The study was planned to recruit about 700 women. This sample size was calculated by assuming a prevalence of 'any breastfeeding' at least 75% at six months postpartum and accounting for a 10% non-response rate and a 20% drop-out rate. Mothers were interviewed face-to-face at discharge by the first author or a trained health facility staff using a structured questionnaire. Information sought included the mother's perceived paternal attitude on breastfeeding, demographic, socioeconomic and health characteristics, method of delivery, infant feeding practices and other data concerning the infant. The questionnaire was taken from that used in our previous studies in Xinjiang and Zhejiang, China,[2,3] whose validity had been verified for Chinese mothers. In relation to paternal feeding preference, mothers were asked the question: "Does the baby's father have any preference on how you feed your baby?" The response options were: "He prefers bottle breastfeeding"; "He prefers breastfeeding"; "He doesn't mind how I feed my baby" and "Never really discussed the matter with him". A similar question was also asked regarding the maternal grandmother's feeding preference.

The project protocol was approved by the local health authorities and the Human Research Ethics Committee of Curtin University (approval number HR169/2009), and conformed to the provisions of the Declaration of Helsinki. An information letter, which included an explanation of the project, was given and read to each mother. Informed written consent was obtained before commencement of the interview. All participants were assured of anonymity and that they could withdraw freely from the study at any time without prejudice.

Data were entered and analysed using the Statistical Package for the Social Sciences.[16] In addition to univariate statistics, stepwise logistic regression analysis was conducted to ascertain the determinants of 'any breastfeeding' at discharge.[8,17] Independent variables considered were chosen from the pertinent literature; they were plausible factors associated with breastfeeding at discharge and applicable to Chinese mothers residing in rural areas. In this study, 'any breastfeeding' was defined as feeding with breast milk (direct from the breast or expressed) with or without other drinks, formula or other infant food.[18]

RESULTS

Of the 723 mothers recruited from the hospitals, 695 consented, yielding a participation rate of 96%. No significant differences were found between participants and non-participants with respect to age, education level, employment, delivery method, parity, monthly family income, infant gender, and newborn birthweight.

The 695 participants were aged between 18 and 44 years (median 24 years). Almost all (99.8%) were married, about half received more than 9 years of schooling, and 68.8% of them were employed. Although the caesarean section rate of 71.4% appeared to be much higher than the rate of Chinese mothers reported by the World Health Organization (46.2% in 2008),[19] it was comparable with rates documented elsewhere in China, such as Hangzhou, Zhejiang Province (76% in the city, 74% in suburbs and 53% in rural area) and Deyang, Sichuan Province (80%).[3, 20]

Approximately 80% of mothers were delivering their first baby, and 98.4% had a gestation over 37 weeks. The infant gender ratio was about 1:1, with 94% of birthweight within the range 2.5-4 kg. The 'any breastfeeding' rate at discharge was 93.5% (95% CI: 91.7-95.3) in Jiangyou. No significant difference in rate was observed (p=0.29) between mothers delivering at hospitals (94.3%) and township health centres (92.1%).

Table 1 compares potential factors between mothers who breastfed and did not breastfeed at discharge. The univariate analysis identified four factors associated with any breastfeeding at discharge. They were: breastfeeding support from health facility staff during hospital stay, perceived father's feeding preference, perceived maternal grandmother's feeding preference, and timing of decision to breastfeed.

Backward stepwise logistic regression analysis was next performed to ascertain the determinants of any breastfeeding at discharge. The results, presented in Table 2, confirmed that the apparent association with perceived maternal grandmother's attitude towards breastfeeding was no longer significant after adjusting for the effects of other confounding variables. On the other hand, perceived paternal feeding preference remained as a significant determinant. Mothers who perceived their partners as supportive of breastfeeding were more likely to breastfeed at discharge, when compared to mothers who thought their partners preferred bottle feeding or were ambivalent (adjusted OR=4.46, 95% CI: 2.15-9.28). Receiving breastfeeding support from health facility staff during hospital stay was also positively associated with the breastfeeding prevalence at discharge (adjusted OR=3.41, 95% CI: 1.58-7.34). However, mothers who made the decision on infant feeding during or after pregnancy were less likely to breastfeed at discharge than those who decided before pregnancy (adjusted OR=0.46, 95% CI: 0.22-0.93).

DISCUSSION

The 'any breastfeeding' rate of 93.5% (95% CI: 91.7-95.3) at discharge observed in this area of rural China was similar to that in the Xinjiang Uygur Autonomous Region (92.2%, 95% CI: 90.7-93.7).[2] It was higher than the rates in Taiwan (84.1%, 95% CI: 82.3-85.9)[7] and Hong Kong (33.5%, 95% CI: 32.5-34.5),[21] however, was lower than the rate reported for mothers residing in rural areas of Zhejiang Province (97.4%, 95% CI: 96.0-98.8).[22] Com-

Table 1. Characteristics of Sichuan mothers by breastfeeding status at discharge (n = 695)

Factors	Any breastfeeding n (%)	Non-breastfeeding n (%)	Crude OR for any breast feeding (95% CI)	*p*
Maternal age, years				
<25	371 (57.1)	26 (57.8)	1.00	
≥25	279 (42.9)	19 (42.2)	1.03 (0.56-1.90)	0.927
Maternal education				
High school or below	570 (87.7)	43 (95.6)	1.00	
University	80 (12.3)	2 (4.4)	3.02 (0.72-12.7)	0.132
Maternal occupation				
Unemployed	202 (31.1)	15 (33.3)	1.00	
Labourer	270 (41.5)	19 (42.2)	1.06 (0.52-2.13)	0.881
Office worker	178 (27.4)	11 (24.4)	1.20 (0.54-2.68)	0.654
Monthly family income, yuan[†]				
≤3000	322 (53.6)	19 (48.7)	1.00	
>3000	279 (46.4)	20 (51.3)	0.82 (0.43-1.57)	0.556
Parity				
Primiparous	518 (79.7)	37 (82.2)	1.00	
Multiparous	132 (20.3)	8 (17.8)	1.18 (0.54-2.59)	0.683
Gender of infant				
Male	322 (49.5)	19 (42.2)	1.00	
Female	328 (50.5)	26 (57.8)	0.74 (0.40-1.37)	0.344
Birthweight, g				
<2500	10 (1.5)	2 (4.4)	1.00	
≥2500	640 (98.5)	43 (95.6)	2.98 (0.63-14.0)	0.168
Method of delivery				
Vaginal delivery	182 (28.0)	17 (37.8)	1.00	
Caesarean section	468 (72.0)	28 (62.2)	1.56 (0.83-2.92)	0.163
Attending antenatal class				
No	533 (82.0)	33 (73.3)	1.00	
Yes	117 (18.0)	12 (26.7)	0.60 (0.30-1.20)	0.152
Breastfeeding support from health facility staff during hospital stay				
No	73 (11.2)	16 (35.6)	1.00	
Yes	577 (88.8)	29 (64.4)	4.36 (2.26-8.41)	<0.001
Perceived paternal feeding preference				
Other[‡]	80 (12.3)	18 (40.0)	1.00	
Breastfeeding	570 (87.7)	27 (60.0)	4.75 (2.50-9.01)	<0.001
Perceived maternal grandmother's feeding preference				
Other[‡]	56 (8.6)	12 (26.7)	1.00	
Breastfeeding	594 (91.4)	33 (73.3)	3.86 (1.89-7.89)	<0.001
Maternal grandmother breastfed her children				
No	20 (3.1)	3 (6.7)	1.00	
Yes	623 (96.9)	42 (93.3)	2.23 (0.64-7.79)	0.211
Timing of decision on feeding method				
Before pregnancy	367 (56.5)	15 (33.3)	1.00	
During pregnancy or after childbirth	283 (43.5)	30 (66.7)	0.39 (0.20-0.73)	0.003

[†]1 yuan = 0.16 United States dollar
[‡] Formula feeding, be ambivalent about breastfeeding, or did not discuss it with the mother

pared to other Asian countries, our breastfeeding rate was lower than rural Vietnamese (98.3%, 95% CI: 97.1-99.5)[23] but higher than South Korean (81.3%, 95% CI: 78.7-83.9)[24] and Singaporean Chinese women (77.0%, 95% CI: 75.5-78.5).[6]

Perception of paternal attitude towards breastfeeding was found to be a determinant of any breastfeeding. Women who perceived their partners preferred breastfeeding tended to breastfeed at discharge. Although the mother's opinion was used as a proxy of paternal preference, it is still reasonable to expect that the breastfeeding rate in rural China could be improved if more fathers advocated breastfeeding. To persuade more fathers to support breastfeeding, the reasons behind their preference of feeding method need to be understood. According to the literature, fathers of bottle fed babies had a poorer understanding of the advantages of breastfeeding when compared to fathers of breastfed babies. They tended to believe that breastfeeding is painful and leads to sore or cracked nipples.[25] Moreover, fathers whose partners planned to breastfeed exclusively were better informed about breastfeeding, whereas fathers whose partners planned to use infant formula were more likely to believe that breastfeeding is not natural, is bad for breasts, makes breasts ugly and interferes with sex.[26]

Traditional prenatal classes have targeted women by providing information on the benefits of breastfeeding and nursing techniques to promote breastfeeding.[27] More recently, educational training programs that included expectant fathers have positive impact on breastfeeding out-

Table 2. Factors associated with any breastfeeding at discharge from stepwise logistic regression analysis (n = 695)

Factors	n (%)	Adjusted OR for any breastfeeding (95% CI)[†]	*p*
Perceived paternal feeding preference			
Other[‡]	86 (13.6)	1.00	
Breastfeeding	547 (86.4)	4.46 (2.15, 9.28)	<0.001
Breastfeeding support from health facility staff during hospital stay			
No	79 (12.5)	1.00	
Yes	554 (87.5)	3.41 (1.58, 7.34)	0.002
Timing of decision on feeding method			
Before pregnancy	346 (54.7)	1.00	
During pregnancy or after childbirth	287 (45.3)	0.46 (0.22, 0.93)	0.030

[†] Non-significant variables were maternal age, maternal education, maternal occupation, monthly family income, parity, gender of infant, birthweight, method of delivery, attending antenatal class, perceived maternal grandmother's feeding preference, maternal grandmother breastfed her children.
[‡] Formula feeding, be ambivalent about breastfeeding, or did not discuss it with the mother

comes such as breastfeeding initiation,[28] full breastfeeding[29] and exclusive breastfeeding at six months.[30] Therefore, inclusion of both parents in intervention programs and breastfeeding practices should be promoted to further improve the breastfeeding rate in rural China.

Health facility staff also played an important role in helping mothers to breastfeed, and those who received support from staff during hospital stay were more likely to continue breastfeeding after discharge. This finding was consistent with a recent systematic review,[31] and a study of Chinese mother in Australia which demonstrated a higher breastfeeding rate at discharge for women with perceived doctor's support than those without.[5] If the provision of full support from doctors and nurses is ensured and extended to all mothers, the rate of breastfeeding at discharge can be further increased. Moreover, our data suggested that mothers who made the infant feeding decision before pregnancy were more likely to continue breastfeeding at discharge than those who chose to decide during pregnancy or after childbirth. Therefore, educational intervention early in the process targeting potential parents may be worthwhile to influence their decision making. Further research is clearly needed to investigate such possibility for Chinese mothers residing in rural areas.

The apparent association between perceived maternal grandmother's feeding preference and breastfeeding at discharge became non-significant in the multivariable regression model, suggesting that its effect might have been confounded with other determinants. In this study, socioeconomic factors, such as maternal education, occupation and income, were not associated with breastfeeding at discharge. The lack of association was similarly observed in our previous study conducted in the Xinjiang Uygur Autonomous Region.[2] There are few tertiary study opportunities in Jiangyou, and most mothers with a university degree studied in urban areas. Although women with a high level of education are more likely to be influenced by the formula feeding urban culture, they only constituted a small proportion of our sample.

Similarly, method of delivery and parity were not associated with breastfeeding at discharge, consistent with previous studies of Chinese mothers.[2,5,21] The observed rate of caesarean section was 71.4%. High caesarean rates are actually common in China.[3] Reasons for preferring caesarean section include fear of pain during vaginal delivery, believing that caesarean section is safer and better, and preferring the baby to be born at a particular time.[32]

Several limitations should be considered in conjunction with the findings. Although Jiangyou is representative of rural Sichuan, the results may not necessarily be generalized to the entire Province due to variations in culture between ethnic and minority subgroups. Another limitation concerns the proxy nature of paternal feeding preference, since the actual attitude of the fathers may not be reflected by the mothers' opinion.[33] The same comment also applies to infant feeding preference by the maternal grandmother. A direct survey of family members would provide useful insights on their knowledge and attitudes towards breastfeeding.

In conclusion, this prospective cohort study of Chinese mothers reported a high breastfeeding rate of 93.5% at discharge in a rural area of Sichuan Province. Perceived paternal feeding preference, support from hospital staff, and timing of decision on infant feeding method, were found to be determinants of any breastfeeding at discharge. Breastfeeding education programs targeting expectant parents and those planning to have children should be promoted to further increase the breastfeeding rate in rural China.

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AUTHOR DISCLOSURES

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Original Article

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中国农村地区产妇出院时母乳喂养的影响因素

本篇研究目的是调查中国农村地区产妇出院时的母乳喂养率及其影响因素。该婴儿喂养调查采用了前瞻性队列研究方法，于 2010 年至 2011 年期间在中国四川省江油市进行。统计方法使用了邏輯斯(logistic)回归分析，用于确定产妇出院时母乳喂养率的影响因素。本研究共调查了 695 名母亲，其年龄分布于 18 至 44 岁。结果显示，产妇出院时的母乳喂养率为 93.5%(95% CI: 91.7-95.3)。产妇所认为的婴儿父亲对母乳喂养的偏好和实际出院时的母乳喂养情况呈正相关(OR=4.46, 95% CI: 2.15-9.28)。其余的影响因素包括：住院期间受到来自医院员工的母乳喂养支持(OR=3.41, 95% CI: 1.58-7.34)和在怀孕期间或生产之后决定喂养方式(OR=0.46, 95% CI: 0.22-0.93)。总之，建议在住院期间给予产妇全方面的母乳支持，以及开展针对准父母的教育课程，从而进一步提高中国农村地区的产妇出院时母乳喂养率。

关键字：母乳喂养、中国、医院支持、父亲的态度、出院