

FACTORS AFFECTING THE PATTERN OF POSTPARTUM AMENORRHEA

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The contraceptive effect of breastfeeding is the most important determinant of growth rate in traditional populations which do not have access to modern forms of contraception. It has long been established that breastfeeding prevents pregnancies more than any other form of contraception in many developing countries.¹ The lactational amenorrhea method (LAM) protects against fertility to 98% within the first six months after delivery because among breastfeeding women, the occurrence of menstruation usually proceeds to ovulation in the first six months.² After six months, it is likely the first ovulation usually proceeds to the first menstruation.¹ Therefore, the reliability of LAM decreases as a method of contraceptive after six months of postpartum amenorrhea (PPA). However, women who continue to breastfeed for 1-2 years and remain amenorrheic still have good protection against fertility with a longer duration of PPA.²

From 13 prospective studies in both developed and developing countries, the consensus is that the birth-spacing effect of breastfeeding is achieved when a mother "fully" or nearly "fully" breastfeeds and remains amenorrheic.³ In addition, the acceptability and efficacy of the LAM have been confirmed in a wide variety of settings.^{4,5}

The duration of PPA is affected by several factors. In particular, exclusive breastfeeding (EBF) can prolong its duration. In a study of 247 women in Burundi,⁶ the mean of PPA period of non-EBF mothers was significantly lower than that of EBF mothers (5.7 vs. 13.9 months). Heing et al. reported that the duration of PPA among US women who breastfed for six months or more was significantly longer compared with that of a formula-feeding group.⁷ In a cross-sectional survey of 1134 women from Egypt, 50% and 34% of mothers were still amenorrheic after the four and six months postpartum periods, respectively.⁸ In a prospective study of 444 women from Indonesia, it was reported that earlier supplementation corresponded with shorter duration of amenorrhea for the majority of women.⁹ In a study of the effect of breastfeeding pattern on the

duration of amenorrhea among 676 Chilean women, it was reported that the first bleeding was experienced before the end of six months of postpartum by 57% of cases.¹⁰ The association of breastfeeding with duration of amenorrhea was weak, however, the risk of experiencing the first bleeding was reduced with a higher number of nursing episodes of suckling per day. In fact, the intensity of suckling causes the secretion of prolactin hormone which prevents ovulation and estrogen synthesis, thus prolonging the duration of amenorrhea.¹¹

Since the length of PPA is quite variable and depends on several factors, including maternal age and parity, as well as duration and frequency of suckling, it is important to document the pattern and determination of PPA in different populations for practical implications in the primary health care setting.

In recent years, the health care system in the north of Iran had community-based intervention of breastfeeding practice, in particular, for exclusive breastfeeding within the first six months of the infant's life. In order to have an updated data for maternal and child health care and administration of family planning, this paper sought to examine the pattern of PPA and breastfeeding-related factors (exclusive breastfeeding, frequency of suckling per day, duration of breastfeeding, age and parity) and their relationship to the resumption of menstruation among Iranian women who live in Babol in the north of Iran.

Subjects and Methods

A cross-sectional study was carried out with a random sample of 600 women who lived in rural and urban area of Babol in the north of Iran in 1997. The inclusion criteria was having a delivery within the last 12-24 months. The selected women were interviewed with a designed questionnaire by nurses and health care givers. In a pilot study, the reliability of the questionnaire was assessed by test-retest method which yielded a high degree of precision (>90%). The data of PPA, return to menstruation, breastfeeding-related variables (the frequency of suckling per day, the duration of breastfeeding, exclusive breastfeeding), parity, age and area of residence, etc., were recorded by the interviewer. Exclusive breastfeeding was defined as "full" breastfeeding without any liquid or solid food during the first six months of the infant's life. All 600

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TABLE 1. Kaplan-Meier survival probability of postpartum amenorrhea and 95% confidence interval (CI) with respect to the infant's feeding status.

Duration of amenorrhea (month)	Type of infant's feeding within the first 6 months					
	Exclusive breast feeding		Non-exclusive breast feeding		Bottle feeding only	
	Survival probability	95% CI	Survival probability	95% CI	Survival probability	95% CI
1	0.94	0.91-0.96	0.93	0.89-0.96	0.80	0.50-0.93
2	0.65	0.59-0.70	0.62	0.59-0.68	0.33	0.12-0.56
3	0.57	0.52-0.63	0.54	0.47-0.60	0.20	0.12-0.56
4	0.53	0.47-0.58	0.48	0.42-0.54	0.20	0.05-0.42
5	0.51	0.45-0.56	0.45	0.39-0.51	0.20	0.05-0.42
6	0.43	0.38-0.48	0.37	0.32-0.43	0.13	0.02-0.35
7	0.38	0.33-0.43	0.33	0.27-0.39	0.13	0.02-0.35
8	0.33	0.28-0.38	0.30	0.25-0.36	0.07	0-0.26
9	0.30	0.25-0.35	0.25	0.20-0.31	0.07	0-0.26
10	0.28	0.23-0.33	0.23	0.18-0.28	0.07	0-0.26
11	0.26	0.22-0.31	0.21	0.16-0.26	0.07	0-0.26
12	0.18	0.14-0.23	0.14	0.09-0.17	0.07	0-0.26
13	0.17	0.13-0.21	0.13	0.08-0.16	–	–
14	0.15	0.11-0.19	0.12	0.07-0.15	–	–
15	0.14	0.10-0.18	0.11	0.06-0.14	–	–
16	0.12	0.09-0.16	0.09	0.05-0.13	–	–
17	0.12	0.09-0.16	0.08	0.03-0.11	–	–
18	0.10	0.07-0.14	0.06	0.03-0.11	–	–
19	0.08	0.05-0.12	0.06	0.03-0.11	–	–
20	0.08	0.05-0.12	0.06	0.03-0.11	–	–
21	0.08	0.05-0.12	0.06	0.03-0.11	–	–
22	0.08	0.05-0.12	0.06	0.03-0.11	–	–
23	0.08	0.05-0.12	0.06	0.03-0.11	–	–
24	0.08	0.05-0.12	0.06	0.03-0.11	–	–

TABLE 2. The coefficient of univariate Cox regression model with standard error (SE) and the risk ratio (RR) with 95% confidence interval (CI) and *p*-value.

Variables	Coefficient	SE	<i>P</i> -value	Risk ratio (RR)	95% CI of RR
Type of infant's feeding*					
Exclusive breast feeding	-0.71	0.27	0.008	0.49	0.29-0.83
Non-exclusive breast feeding	-0.58	0.27	0.03	0.56	0.33-0.94
Rural vs. urban	-0.85	0.08	0.32	0.92	0.77-1.09
Parity	-0.12	0.03	0.001	0.88	0.83-0.94
Frequency of suckling at supplementation (per day)	-0.03	0.01	0.022	0.97	0.95-0.99
Weaning	0.27	0.09	0.006	1.31	1.08-1.59
Frequency of suckling per day	-0.03	0.01	0.003	0.96	0.94-0.99
Breastfeeding >6 months	-0.47	0.16	0.003	0.62	0.64-0.85
Age of mother**					
20-29 (2)	-0.13	0.16	0.40	0.87	0.64-1.19
30-39 (3)	-0.31	0.17	0.07	0.73	0.52-1.03
40 + (4)	-0.31	0.41	0.45	0.73	0.33-1.63
Age of mother (year)	-0.02	0.008	0.01	0.98	0.96-0.99

*The comparison group: bottle feeding only; **the comparison group: age <20 years.

subjects under study gave consent to participate. Only two cases had missing data on the duration of PPA. Thus, the analysis was carried out on 598 subjects.

Data Analysis

Data on the dependent variable under study (the duration of PPA) was censored in some women, and the resumption of their menstruation was not stated. Thus, the mean of PPA was not an appropriate index for assessment. Instead of an analysis of the mean of PPA, the survival analysis was conducted¹² using the statistical software of SPSS for Windows (version 9.0). The survival probability of the pattern of PPA was estimated using nonparametric method of Kaplan Meier. In the univariate analysis, the Mantel-Cox test was carried out to compare the overall survival curve between different groups under study. The

univariate and multivariate Cox regression model was also used to determine the effect of breastfeeding, parity and age on the risk of the first menstruation after delivery. The relative risk (RR) of resumption of menstruation of each level (group) of factors was estimated in comparison with baseline group in univariate and multivariate analysis. The 95% confidence interval (CI) of RR and its *P*-value were calculated.

Results

The results showed that the mean (SD) duration of exclusive breastfeeding was five (3.4) months. Of the 598 subjects under study, 324 (53.5%) mothers practiced EBF, 259 (43%) subjects practiced non-EBF, and 15 (2.5%) practiced bottle feeding only within the first 6 months. A

total of 554 (92.6%) mothers fed their infants with colostrum at birth, 463 (77.4%) mothers were rooming in with their infants immediately after delivery, and 187 (31.3%) mothers delivered by cesarean section. Among 324 EBF women, 288 (89%) returned to menstruation whereas among 259 non-EBF, 235 (91%) women had menstruated at the time of study, and all 15 women who bottle-fed their infants had already had their first menstruation.

Table 1 shows that at the first month of the postpartum period, 94% of EBF women, 93% of non-EBF women, and 80% of bottle-feeding only women were still amenorrheic, and at 6 months, 43%, 37%, and 13% respectively, were still amenorrheic. At 12 months postpartum, these rates were 18%, 14%, and 17% respectively. Mantel-Cox test showed that there was a significant difference in the duration of amenorrhea among the three groups under study ($P=0.006$). The women with EBF had significantly longer duration of PPA than the others. The results also indicate that mothers who breastfed for more than six months had a longer duration of PPA than mothers who breast fed for six months or less ($P=0.001$). In addition, women who continued breastfeeding had longer duration of PPA compared with women who had already weaned their infants ($P=0.002$).

Table 2 shows the results of univariate Cox regression analysis. The risk ratio (RR) of the first menstruation for EBF women and non-EBF women compared with women who bottle-fed only were $RR=0.49$ (95% confidence interval (CI): 0.29-0.83); and $RR=0.56$ (95% CI: 0.33-0.94) respectively. Thus, the risk of resumption of menstruation was decreased significantly by 51% among EBF mothers. Among women who breastfed for more than six months compared with those women who breastfed for six months or less, the RR was 0.62 (95% CI: 0.46-0.85). The risk was also significantly decreased by 4% when an episode of suckling per day was increased ($RR=0.96$; $P=0.003$); 95% CI: 0.94-0.99). The weaning significantly increased the risk of resumption of menstruation by 31%.

Table 2 also shows that the parity and age were negatively associated with the duration of amenorrhea. By increasing a parity, the RR of resumption was $RR=0.88$ (95% CI: 0.83- 0.94), i.e., the risk was significantly decreased by 12% ($P=0.001$). By increasing the age of a mother by a year, the RR was 0.98 ($P=0.01$). When the age was categorized in four groups, the risk of resumption of menstruation was decreased by 27% among mothers of age 30 or more vs. those less than 20 years, but the result was not significant.

The results of stepwise Cox regression analysis, the parity, the frequency of suckling and the duration of breastfeeding for more than six months were significantly negatively associated with the risk of resumption of menstruation. The adjusted RR by increasing one parity was 0.89 ($P=0.001$) and the adjusted RR by increasing an episode of suckling per day was 0.97 ($P=0.02$). For the duration of breastfeeding of more than six months (vs. six

months or less), the adjusted RR was 0.72 (0.04), i.e., the risk of resumption of menstruation was decreased by 0.28%.

Discussion

The findings of this study showed that practicing EBF within the first six months, a longer duration of breastfeeding (>6 months) and higher frequency of episodes of suckling per day corresponded with a lower risk of menstruation. In comparison with other findings in different countries, the results of this study are consistent with those reported in the literature.⁶⁻¹⁰

There is a biological plausibility of the effect of breastfeeding on the delaying of resumption of menstruation and ovulation. The higher frequency of suckling causes stimulation of the hypothalamus, where it causes a local release of beta-endorphin. This action depresses the gonadotrophin (GnRH) secretion, ovarian follicular secretion and menstruation.² In fact, the hypothalamic beta-endorphin release also inhibits dopamin production, resulting in increasing prolactin secretion. The higher the frequency of suckling, the more beta-endorphin is secreted, hence leading to a longer duration of lactational amenorrhea.²

The present study shows a significantly positive association between parity and duration of amenorrhea. In a study of US women who breastfed for six months or more, the duration of amenorrhea was positively associated with parity.⁷ In a survey of Chilean women, it was also found that parity has a negative effect on the risk of resumption of menstruation.¹⁰ In this study, there was a negative association between the age of mother and the risk of return to menstruation, but this association was not significant after adjusting parity and breast-feeding related factors.

A potential limitation of this cross-sectional study might be the problem of recall in the measurement of the duration of PPA, since the PPA data was collected 12-24 months after delivery. However, there was no reason for a systematic difference of recall error with respect to the type of infant feeding. Because of the non-differential error on the measurement of duration of PPA, the comparison of the pattern of PPA in different groups was unbiased and thus the estimation of RR was not distorted.¹³

In term of acceptability, efficacy and practicality, the LAM is an acceptable method which is convenient for widespread use. Its 98% efficacy rate has been confirmed in a wide variety of settings.³ There is also a possibility of the use of LAM beyond six months. In addition, it is a cost-effective method. On the other hand, some aspects of LAM are negative, such as the fact that it cannot protect against sexually transmitted diseases (STDs), and it requires intensive breastfeeding and suckling.¹⁴ Although, the results of this study confirmed that breastfeeding can delay the resumption of postpartum menstruation, nevertheless, breastfeeding alone should not be considered as a method

of contraceptive. It is necessary to use modern forms of contraception in family planning.

In conclusion, the pattern of breastfeeding, the higher frequency of suckling per day, the duration of breastfeeding and parity, are all important determinants in delaying the resumption of menstruation and ovulation. Thus, it is recommended that LAM be included in the range of services available in maternal and child health, family planning and other primary health care settings.

References

1. Cameron M, Hofvander Y. Manual on feeding infants and young children. London: Oxford Medical Publication, 1976.
2. Short RV. Lactational infertility in family planning. *Ann Med* 1993; 25:175-80.
3. Kennedy K, Reversa R, McNeilly AA. Consensus statement on the use of breastfeeding: a family planning method. *Contraception* 1989; 39:477-96.
4. Labbok MH, Hight-Laukaran V, Peterson AE, et al. Multicentre Study of the Lactational Amenorrhea Method (LAM). I: Efficacy, Duration and Implication for Clinical Application. *Contraception* 1997;55:327-36.
5. Hight-Laukaran V, Labbok MH, Peterson AE, et al. Multicentre Study of the Lactational Amenorrhea Method (LAM). II: Acceptability, Utility and Policy Implications. *Contraception* 1997; 55:337-46.
6. Exceller JL, Charron S, Faila-Bachati C, et al. Breastfeeding and birth spacing in Burundi: an approach. *Med Trop Mars* 1988;48:117-22.
7. Heinig MJ, Nommsen-Revers LA, et al. Factors related to duration of postpartum amenorrhea among USA women with prolonged lactation. *J Biosoc Sci* 1994;26:515-27.
8. El-Sahn F, Darwish O. Breast-feeding and fertility. Part 1. Lactational amenorrhea. *J Egypt Public Health Assoc* 1992;67:291-309.
9. Jones RE. The effect of initiation of child supplementation on the resumption of postpartum menstruation. *J Biosoc Sci* 1990;22:173-89.
10. Diaz S, Rodriguez G, Marshall G, et al. Breastfeeding pattern and the duration of lactational amenorrhea in urban women. *Contraception* 1988;38:37-51.
11. Valayati A. Health of infants: a set of articles in the health of infants. Publication of Ministry of Health of Iran. Tehran Center of Health Education, 1985.
12. Harris EK, Albert A. Survivorship analysis for clinical studies. New York: Marcel Dekker Inc., 1991.
13. Rothman KJ. Modern epidemiology. Boston: Little Brown Company, 1986:84-6.
14. Kennedy KL, Kotelchuck M. Commentary, policy consideration for the introduction and promotion of the lactation amenorrhea method (LAM): advantages and disadvantages of LAM. *J Hum Lactation* 1998;14:191-20.