Determinants of the duration of lactational amenorrhoea among mothers in Alexandria

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محددات مدة ضهى الإرضاع بين الأمهات في الإسكندرية

خديجة أمين خليل وهدى يوسف عطا وفاتن أنيس كامل وراندا محمود يوسف

خلاصة : تم استجواب ثلاثمئة امرأة لدى كل منهن طفل يتراوح عمره من ستة شهور إلى أربعة وعشرين شهرا ، وذلك لمعرفة خصائصهن الاجتماعية الديمغرافية والبيولوجية ، وما تلقينه من رعاية قبل الولادة ، وما واجهنه من مشكلات صحية أثناء الحمل وبعد الولادة . كما أردنا جمع معلومات عن ممارسات الإرضاع من الثدي ، وكيفية تغذية الأطفال ومدة الضهى (انقطاع الطمث) بعد الوضع . ولقد تبين من تحليل انحدار كوكس متعدد المتغيرات ، أن التماس الرعاية قبل الولادة ، ووقت بداية الإرضاع من الثدي ، وعمر الطفل عند إعطائه أغذية تكميلية ، كانت هي المحددات المستقلة الوحيدة لمدة ضهى الإرضاع . ويجب إيلاء أهمية جوهرية للتثقيف الصحي حول ممارسة الإرضاع من الثدي ، إذا أردنا إطالة هذه المدة .

ABSTRACT A total of 300 women nursing a child aged 6 to 24 months were interviewed to determine their sociodemographic and biological characteristics, the antenatal care received, health problems encountered during pregnancy and the postpartum period, breast-feeding practices, child nutrition, and the duration of postpartum amenorrhoea. Multivariate Cox regression analysis revealed that seeking antenatal care, the time of initiation of breast-feeding, and the infant's age at the time of supplement introduction were the only significant independent determinants of the duration of the lactational amenorrhoea. To prolong the duration of lactational amenorrhoea, health education regarding good breast-feeding practices is of crucial value.

Facteurs déterminants de la durée de l'aménorrhée liée à la lactation chez les mères à Alexandrie

RESUME Trois cents femmes allaitant un enfant âgé de 6 à 24 mois ont été interrogées pour déterminer leurs caractéristiques socio-démographiques et biologiques, les soins prénatals dont elles ont bénéficié, les problèmes de santé qu'elles ont rencontrés durant la grossesse et dans la période du post-partum, les pratiques d'allaitement au sein, la nutrition de l'enfant et la durée de l'aménorrhée après l'accouchement. L'analyse effectuée suivant la méthode à plusieurs variables en utilisant le modèle de régression de Cox a révélé que les consultations prénatales, le moment où l'allaitement au sein a commencé et l'âge du nourrisson au moment de l'introduction d'aliments de complément constituaient les seuls déterminants indépendants importants de la durée de l'aménorrhée liée à la lactation. Pour prolonger la durée de l'aménorrhée liée à la lactation, une éducation sanitaire concernant les bonnes pratiques d'allaitement maternel est d'une importance cruciale.

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Introduction

Egypt is one of the most populous countries of the world. The rapid rate of population growth is a major threat to the nation's future. It impedes all development efforts and frustrates hopes for improving the quality of life for every Egyptian. The regulation of fertility offers the only solution to this problem. Many factors are proximate determinants of fertility, including contraceptive use [*1–3*] and breast-feeding [*3*]. In industrialized countries, virtually all married women resort to contraception at some time in their reproductive period. In contrast, the proportion reporting such use in developing countries is extremely low [*4,5*].

The lactational amenorrhoea method, which entails the continuation of full or nearly full breast-feeding and remaining amenorrhoeic during the first six months postpartum, was agreed by the Bellagio Consensus Conference to be adopted as an initial method of contraception [*6*]. Breast-feeding postpones the return of fertility by delaying ovulation and menses through the suppression of hormones that stimulate the maturation and release of ova [*7,8*]. The return of menses is a good indicator for regaining fertility and the need for an alternative method of contraception [*9*]. During the first six months postpartum, the lactational amenorrhoea method is 98% effective in preventing conception [*6*]. The cumulative six-month life table pregnancy rate was 0.45% among women who relied on lactational amenorrhoea as their only family planning method [*10*]. Furthermore, the analysis of data from nine prospective studies in different countries, including Egypt, concluded that, irrespective of the introduction of infant supplements, the probability of conception during the period of postpartum amenorrhoea was similar to that of modern contraceptive methods [*11*].

Since the lactational amenorrhoea method has been proved to be efficacious, this study was undertaken to reveal the determinants of the duration of lactational amenorrhoea among mothers in Alexandria.

Materials and methods

A total of 300 women from Alexandria participated in the study. Eligible women were those who were still nursing a child aged from 6 to 24 months. The cluster sample survey was adopted to select eligible women. Thirty clusters, the usual chosen number, were identified. From each cluster, 10 women meeting the inclusion criteria were selected, yielding a total of 300 women.

All women selected were subjected to an interview questionnaire designed to reveal: their sociodemographic and biological characteristics; the antenatal care received; the type of delivery; the adopted contraceptive method; health and psychosocial problems encountered during pregnancy and in the puerperium; breast-feeding practices and child nutrition; and the duration of postpartum amenorrhoea. The operational definition of the duration of postpartum amenorrhoea adopted in the present study was the time between childbirth and the onset of any vaginal bleeding or spotting, other than postpartum bleeding, whether or not the woman thought that it was similar to her pre-pregnancy menses [*11*].

Data were analysed using a microcomputer and the Statistical Package of Social Sciences (SPSS version 6.0). Kaplan–Meier survival, univariate and multivariate Cox regression analyses, which consider censored events, were performed. The former is used for categorial variables while the latter for both continuous and categorial

ones, and to quantify the risk of resuming menstruation in association with the studied variables. The 5% level was chosen to judge the significance of the results obtained.

Results

For the 300 nursing mothers, the mean age was 29.62 ± 4.85 years with a minimum of 18 years and a maximum of 49 years. Nearly half the mothers (44.3%) were illiterate or just able to read and write, while university graduates constituted 7.3% of the sample. Only 16.3% of the mothers were working women. At the time of the interview, 80.0% of the mothers had resumed their menses, the others were still amenorrhoeal. For the whole sample, the mean duration of lactational amenorrhoea was 5.53 months (SE = 0.36; 95% confidence interval [CI] = 4.83–6.24).

Table 1 presents the sociodemographic determinants of the duration of postpartum amenorrhoea. It reveals that mothers whose family income was less than 300 Egyptian pounds per month experienced a significantly longer duration of lactational amenorrhoea than those whose monthly family income was between 300 to 500 Egyptian pounds or was greater than 500 Egyptian pounds (log rank test = 9.47; $P = 0.0088$). On the other hand, neither the mother's level of education nor her working status was a significant predictor of the duration of lactational amenorrhoea.

The mother's biological characteristics, including her age, age at menarche, parity, as well as the interbirth interval, were not related to the length of postpartum amenorrhoea. However, it was observed that primiparae and those who reported an interbirth interval of more than four years experienced a shorter duration of lactational

Table 1 **Mean duration of lactational amenorrhoea in relation to sociodemographic characteristics**

Sociodemographic determinant	No.	%	Duration (months)		95% confidence interval	Log rank test
			Mean	Standard error		
Mother's education						
Illiterate/read and write	133	44.3	5.73	0.55	4.65–6.80	
Primary/preparatory	31	10.3	5.19	0.96	3.31–7.07	0.54
Secondary	114	38.0	5.35	0.56	4.25–6.45	($P = 0.9093$)
University	22	7.3	5.25	1.11	3.07–7.42	
Family income (EGP) per month						
< 300	138	46.0	6.43	0.53	5.36–7.50	9.47[a]
300–500	151	50.3	5.49	1.27	3.01–7.97	($P = 0.0088$)
> 500	11	3.7	4.50	0.45	3.62–5.38	
Working status						
Housewife	251	83.7	5.74	0.40	4.96–6.52	1.65
Working	49	16.3	4.15	0.60	2.97–5.33	($P = 0.1991$)

[a] *Statistically highly significant*
EGP = Egyptian pounds

Table 2 **Mean duration of lactational amenorrhoea in relation to the mother's biological characteristics**

Biological characteristic	No.	%	Duration (months)		95% confidence interval	Log rank test
			Mean	Standard error		
Number of children other than the index child						
None	87	29.0	4.93	0.60	3.80–6.15	1.02
1–3	182	60.7	5.55	0.45	4.66–6.44	(P = 0.5993)
4–5	31	10.3	6.43	1.16	4.16–8.70	
Previous birth interval[a]						
< 2 years	23	11.3	6.26	1.26	3.80–8.72	1.03
2–4 years	153	75.4	5.84	0.51	4.84–6.85	(P = 0.5966)
> 4 years	27	13.3	4.37	0.82	2.76–5.97	

	Hazard rate	95% CI	*P* value
Mother's age (years)	0.9924	0.9671–1.0183	0.5599
Age at menarche (years)	0.9453	0.8545–1.0458	0.2753

[a] *Primiparae were excluded*

amenorrhoea, although the differences were statistically not significant (Table 2).

Receiving antenatal care and vitamin and mineral supplements during pregnancy were found to be significant predictors of the duration of postpartum amenorrhoea. A significantly shorter duration was encountered among women who had attended antenatal care (log rank test = 13.51; P = 0.0002) as well as those who received vitamin and mineral supplements during pregnancy (log rank test = 11.12; P = 0.0009). The estimated risk of resuming menstruation was 1.2 times higher among women who sought antenatal care (hazard rate = 1.28; 95% CI = 1.09–1.51) and those who received vitamin and mineral supplements during pregnancy (hazard rate = 1.20; 95% CI = 1.05–1.37). It was observed that women who had had a normal delivery experienced a longer duration of postpartum amenorrhoea compared to those who had had an operative delivery. This longer period was also observed among women who used contraceptive methods other than hormonal ones. However, these differences were statistically not significant (Table 3).

The duration of postpartum amenorrhoea was not found to be affected by maternal ill-health or psychosocial problems encountered during pregnancy and in the postpartum period (Table 4).

Table 5 presents the duration of postpartum amenorrhoea among the mothers in relation to breast-feeding practices and child nutrition. The time of initiation of breast-feeding is a significant predictor of the duration of lactational amenorrhoea. The estimated risk of resuming menstruation increases by 1.1 times for each one-hour delay in the initiation of breast-feeding (hazard rate = 1.0968; P = 0.0025; 95% CI = 1.0428–1.1528). Moreover, the mean duration of lactational

Table 3 **Mean duration of lactational amenorrhoea in relation to the antenatal care received, vitamin and mineral intake during pregnancy, type of delivery and the type of contraception used**

Variable	No.	%	Duration (months)		95% confidence interval	Log rank test
			Mean	Standard error		
Antenatal care received						
Yes	232	77.3	4.78	0.37	4.05–5.51	13.51[a]
No	68	22.7	8.01	0.84	6.35–9.96	(P = 0.0002)
Vitamin and mineral intake during pregnancy						
Yes	180	60.0	4.59	0.42	3.78–5.41	11.12[a]
No	120	40.0	6.85	0.61	5.65–8.05	(P = 0.0009)
Type of delivery						
Normal	267	89.0	5.62	0.39	4.86–6.38	0.23
Operative	33	11.0	4.64	0.75	3.17–6.12	(P = 0.6294)
Type *of contraception used*						
Hormonal	57	19.0	4.60	0.78	3.07–6.14	1.61
Other methods	243	81.0	5.72	0.40	4.94–6.51	(P = 0.2042)

[a] *Statistically highly significant*

Table 4 **Mean duration of lactational amenorrhoea in relation to maternal ill-health and psychosocial problems encountered during pregnancy and the postpartum period**

Problem	No.	%	Duration (months)		95% confidence interval	Log rank test
			Mean	Standard error		
Health problems during pregnancy						
Yes	27	9.0	4.13	0.60	2.96–5.30	0.17
No	273	91.0	5.57	0.38	4.83–6.30	(P = 0.6801)
Health problems in the postpartum period						
Yes	8	2.7	5.53	0.36	4.82–6.25	0.01
No	292	97.3	4.23	0.73	2.80–5.66	(P = 0.9327)
Psychosocial problems in the postpartum period						
Yes	9	3.0	5.59	0.37	4.87–6.32	1.70
No	291	97.0	3.70	0.58	2.56–4.84	(P = 0.2042)

Table 5 **Mean duration of lactational amenorrhoea in relation to breast-feeding practices and child nutrition**

Breast-feeding practice and child nutrition	No.	%	Duration (months)		95% confidence interval	Log rank test
			Mean	Standard error		
Providing glucose after delivery[a]		(*n* = 298)				
Yes	151	50.7	4.42	0.43	3.58–5.26	9.58[c]
No	147	49.3	6.58	0.56	5.48–7.67	(*P* = 0.0020)
Breast-feeding schedule[a]		(*n* = 296)				
Fixed	24	8	4.72	0.86	3.04–6.40	0.01
On demand	272	91.9	5.57	0.37	4.83–6.30	(*P* = 0.9056)
Breast-feeding at night[a]		(*n* = 295)				
Yes	241	81.7	5.67	0.39	4.91–6.42	0.60
No	54	18.3	5.28	0.95	3.41–7.14	(*P* = 0.4375)
Feeding from both breasts at each feed[a]		(*n* = 292)				
Yes	221	75.7	5.45	0.41	4.64–6.25	0.10
No	71	24.3	5.77	0.76	4.27–7.26	(*P* = 0.7495)
Provision of formula		(*n* = 300)				
Yes	46	15.3	4.39	0.66	3.11–5.68	0.78
No	254	84.7	5.66	0.39	4.89–6.42	(*P* = 0.3786)
Provision of supplementation before the age of 4 months		(*n* = 300)				
Yes	189	63.0	5.13	0.44	4.28–5.99	3.34
No	111	37.0	6.23	0.61	5.03–7.43	(*P* = 0.0678)

	Hazard rate	95% CI	*P* value
Time of initiation of breast-feeding (hours)	1.0968	1.0428–1.1528	0.0025[c]
Age of introducing supplements (months) (*n* = 236)[b]	1.16360	1.0198–1.3275	0.0243[c]

[a] *Mothers who gave answers such as "don't remember", "don't know" or "sometimes" were excluded from the analysis*

[b] *At the time of the interview, 64 infants were exclusively breast-fed*

[c] *Statistically significant*

amenorrhoea was significantly longer among mothers who did not provide glucose to their infants immediately after delivery compared to those who did (log rank test = 9.58; $P = 0.0020$). Providing glucose to the neonate immediately after delivery is associated with an estimated risk of 1.2 of resuming menstruation (hazard rate = 1.18; 95% CI = 1.04–1.34). A longer duration of postpartum amenorrhoea was observed among mothers who introduced supplements in conjunction with breast-feeding

Table 6 **Multivariate Cox regression of the significant predictors of the duration of lactational amenorrhoea**

Significant predictor	Hazard rate	95% CI	*P* value
Time of initiation of breast-feeding (one-hour delay)	1.0700	1.0008–1.1440	0.0474[a]
Acceleration of supplement introduction (one month)	1.1704	1.0153–1.3490	0.0300[a]
Attending antenatal care	1.2082	1.0030–1.4551	0.0464[a]

[a] *Statistically significant*

after the age of four months compared to those who adopted such practice before that age, but the difference fell short of being statistically significant (log rank test = 3.34; $P = 0.0678$). However, the infant's age at the time of supplementation was a significant predictor of the duration of lactational amenorrhoea. The risk of resuming menstruation is 1.2 times higher for each month of accelerating supplement introduction (hazard rate = 1.16360; $P = 0.0243$). On the other hand, none of the other breast-feeding practices were related to the duration of lactational amenorrhoea.

Considering all significant predictors of the length of postpartum amenorrhoea, the multivariate Cox regression revealed that seeking antenatal care, the time of initiation of breast-feeding, and the infant's age at the time of supplement introduction are the only significant predictors of the duration of lactational amenorrhoea. The estimated risk of resuming menstruation is 1.1 times higher for each one-hour delay in the initiation of breast-feeding (hazard rate = 1.0700; $P = 0.0474$), and 1.2 times higher for each month of accelerating supplement introduction (hazard rate = 1.1704; $P = 0.0300$). In addition, women who attended antenatal care were 1.2 times more likely to regain their menses earlier compared to those who did not seek such service (hazard rate = 1.2082; $P = 0.0464$) (Table 6).

Discussion

Lactational amenorrhoea plays a key role in regulating fertility. The associated infertility takes two forms: a period of complete infertility during lactational amenorrhoea when ovulation is suppressed, followed by a variable period of lowered fecundity after the resumption of ovulatory cycles [*12*].

In the present study, considering women who had regained their menses and those who were still amenorrhoeal, the mean duration of lactational amenorrhoea was 5.5 months. This is similar to that reported by previous studies conducted in Alexandria [*13*] and Saudi Arabia [*14*] in which only women who resumed their menses were considered. A longer duration of postpartum amenorrhoea of 9.5 months was reported among Australian women [*15*].

The length of breast-feeding as a predictor of the duration of lactational amenorrhoea has been established by other studies [*11,16*]. The present study investigated other breast-feeding practices. The results indicate that early initiation of breast-feeding and refraining from providing the neonate with glucose immediately after delivery are associated with a significantly longer duration of postpartum amenorrhoea. In fact, a relation between early initiation of breast-feeding and the provision of glucose does exist. Mothers who

did not provide their infants with glucose immediately after delivery initiated breastfeeding at a significantly earlier time (1.34 ± 0.945 hours) than those who did (2.40 ± 2.34 hours) ($t = 5.009$; $P < 0.0001$). This was further emphasized by the results of the multivariate analysis.

The key effect in the mechanism of lactational amenorrhoea is the suckling-induced changes in the hypothalamus sensitivity to the feedback effects of ovarian steroids [*7*]. This effect is exerted for a longer duration among women who breastfeed their infants frequently day and night [*6,7*] and on demand [*5,17*]. The association of such practices with the duration of postpartum amenorrhoea was not revealed by the present study. This could be attributed to the fact that 78.6% of the selected mothers provided their infants with supplements in conjunction with breastfeeding at a mean age of 3.79 ± 1.05 months. The study revealed that the infant's age at the time of the introduction of supplements is a significant predictor of the duration of postpartum amenorrhoea. This finding is in accordance with Mandini et al. [*14*] who reported a positive correlation between infant's age at the time of introduction of supplements and the length of postpartum amenorrhoea. The same was also reported by other investigators [*5,17–21*]. The introduction of supplements is associated with a reduction in the frequency and duration of suckling episodes, which increase the sensitivity of the hypothalamus to the positive feedback effects of estrogen and, in turn, the release of hormones that stimulate the maturation and release of ova [*6,7*].

Several studies have investigated the relation between maternal nutritional status and the duration of postpartum amenorrhoea, taking the mother's weight [*22*]. triceps skin fold [*23*] as well as energy supplementation during pregnancy and lactation [*24–26*] as indicators. In the present study, family income, seeking antenatal care and receiving vitamin and mineral supplementation during pregnancy were considered indicators for maternal nutritional status. This is based on the assumption that higher family income is associated with increasing purchasing power of food items with higher nutritional value. Moreover, during antenatal visits, pregnant women undergo regular weight monitoring and receive health education related to their optimal weight and nutrition. It was revealed that all three variables are significantly associated with a shorter duration of postpartum amenorrhoea. This is in disagreement with a recent study conducted in Bangladesh reporting that maternal nutritional status plays a negligible role in the duration of postpartum lactational amenorrhoea, as it was nearly equal among women classified as well-nourished, moderately-nourished, and undernourished according to their weight [*22*]. On the other hand, other studies have indicated that well-nourished women, as well as undernourished ones given energy supplementation during lactation, have a shorter duration of lactational amenorrhoea [*27–29*] than those receiving no supplements [*30–32*]. This was documented by Lunn and his colleagues [*24,25*] and proved to be associated with a nearly 50% reduction in the plasma prolactin level. However, Kurz et al. [*23*], who considered maternal supplementation and triceps skin fold together with infant supplementation. revealed that maternal triceps skin fold plays a minor role and that the major determinant of the length of postpartum amenorrhoea is infant supplementation. They added that neither maternal supplementation nor any morbid conditions experienced influenced the duration of lactational

amenorrhoea. In this study, the duration of lactational amenorrhoea was not affected by maternal morbid conditions during pregnancy and in the postpartum period. However, the care received during the antenatal period remains associated with a shorter duration of postpartum amenorrhoea.

In Africa, the amount of potential fertility reduced by the use of contraceptives is low [*11*]. It has been claimed that the lactational amenorrhoea method is responsible for preventing more pregnancies in developing countries than all other methods of contraception combined [*5,33,34*]. Kamel et al. [*35*] pointed out that, in Egypt, prolonged lactation and the associated period of infertility serves as the main limitation of population growth. This is particularly true in rural upper Egypt [*3*]. Because of its high acceptability, coupled with its safety, the lactational amenorrhoea method can be used as an initial method of contraception. This study concludes that improvement of breast-feeding practices, including refraining from providing the neonate with glucose after delivery, and the early initiation of breast-feeding, together with delaying supplement introduction, may have a great impact on lengthening the duration of postpartum amenorrhoea and fertility suppression.

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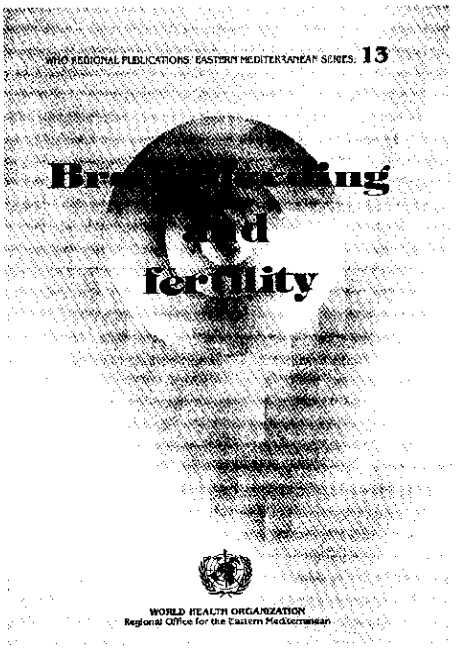

Who is the target audience?

This publication will be of interest to maternal and child health personnel and community health care workers who provide advice and services for family planning and birth spacing

Why has this book been written?

The relationship between breast-feeding and its contraceptive qualities is not fully known and is often misunderstood. This publication explains the physiological role of breast-feeding in contraception, evaluates its effectiveness if certain guidelines are followed, and provides reasons for its failure in many cases.

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