

# Successful sustained lactation following postpartum tubal ligation

K. AMATAYAKUL (1), L. WONGSAWASDI (1), A. MUNGLAPRUKS (1),  
S.M. IMONG (2), D.A. JACKSON (2), A. TANSUHAJ (1), C. SUWANNARACH (1),  
P. CHIWANICH (1), M.M. WOOLRIDGE (2), R.F. DREWETT (3) and  
J.D. BAUM (2)

*(1)Research Institute for Health Sciences, Chiang Mai University, Thailand*

*(2)The Institute of Child Health, University of Bristol, Bristol, UK*

*(3)Department of Psychology, University of Durham, Durham, UK*

## Abstract

This study was undertaken to see whether tubal ligation performed within days postpartum, and associated with a delay in the initiation of breastfeeding, exerts a disruptive influence on successfully establishing lactation among the rural population of northern Thailand.

Lactational performance of 12 rural northern Thai mothers was not affected by the delay in reunion of mothers with their babies as a result of postpartum tubal sterilization procedure when compared with a group of 8 other healthy mothers and babies. The volume of breast milk transferred, frequency of breastfeeding and the total feeding time spent on the breast were similar on days 15, 45, 90, 180 and 360 postpartum. This finding suggests that the pattern of intense breastfeeding activity as practiced by this group of mothers has a stronger influence on prolonged and successful lactation than early contact in the immediate postpartum period.

## Introduction

It is generally considered good medical practice to encourage early suckling at the breast and early skin-to-skin contact between infant and mother during the first few hours after birth. In Western societies, a number of studies have shown that the earlier these practices were carried out, the more likely the mother was to continue breastfeeding, and that the process of breastfeeding itself would probably be more successful and would be likely to continue for a longer period [1-5]. Similar reports from developing societies, however, have not been forthcoming.

In Thailand, traditional postpartum practice has not encouraged such early breastfeeding practice [6]. And if additional postpartum tubal ligation is performed (current estimates suggest that almost 28% of married Thai couples rely on this

method of contraception [7,8]), then the initiation of breastfeeding may be delayed for a further 24 hours or more following the operation. Moreover, if the delivery takes place just before or over the weekend, when routine sterilization is not performed, the infant might not be reunited with its mother until the third, fourth or even fifth postpartum day.

Maternal breast milk is the most important source of nutrients for the young infant, especially in so-called developing countries. Tubal ligation operation is, however, an important and effective method of limiting family size [9].

We thought it was important, therefore, to document whether or not delayed initiation of breastfeeding associated with postpartum tubal sterilization exerts a disruptive influence on the outcome of lactation.

## Materials and methods

### *Subjects*

Fifty-six mothers and their infants were studied in their homes in the rural area of Sanpatong, Chiang Mai Province, northern Thailand. All of these study subjects were visited six times over a period of one year.

The cohort was randomly selected at birth from the population (approximately 30,000) of the three subdistricts (comprising 36 villages) of Sanpatong, located some 25 km southwest of Chiang Mai city. The three subdistricts represent a relatively large area (approximately 60 sq km), so that the findings could be broadly taken to represent that of the rural northern Thai population. The infants were all breastfeeding at the time of recruitment 15 days after birth and had no detectable congenital abnormality, inherited condition or chronic disease.

For the purpose of this report, it was not possible to include all of these 56 subjects in the final analysis, since many mothers had started to take additional hormonal contraceptives before weaning. These mothers were excluded from the analysis for fear that their contraceptive usage might interfere with the lactational process being studied. This left us with 12 mothers who had surgical sterilization performed in the postpartum period, with an associated delayed initiation of breastfeeding, whose lactational outcome was compared with 8 mothers who used no systemic contraceptives. We excluded the remainder, who had already started hormonal contraception.

### *Infants' anthropometries and breastfeeding patterns*

The breastfeeding pattern, together with the infant's weight and length, was recorded in detail by nurse-observers working in shifts in the subject's own home. Each visit lasted two consecutive 24-hour periods and was made when an infant was 15, 45, 90, 180, 270 and 360 days old.

Breastfeeding data comprised quantity of breast milk consumed, feed frequency (or the number of attachments) and duration, and the time breastfeeding was given. The full details of these procedures have been reported previously [10–12]. Briefly, in the daylight hours, intake is measured by test-weighing the infant before and after each feed. At night, when traditionally the infant sleeps besides the mother, and feeds freely, milk intake was measured by indirect test-weighing, a method specifically tailored to measure night-time breast milk intake in such a situation.

Maternal tolerance was good as the infant was minimally disturbed during the night, and feeding patterns were thus not disrupted. Milk intake was measured with a 1 gram resolution and range 0–60 kg (K-Tron Waagen AG, CH-8618, Oetwil-am-see, Switzerland). The standard error for a test-weighing using these balances is  $\pm 3.2$  [13].

### *Maternal anthropometries and biodata*

The mother's weight, parity and height were recorded, as well as age, calculated from birth certificate, to the nearest year.

### *Data analysis*

Maternal biodata profiles were grouped and analyzed. Student's *t*-test was used when comparison was made between the treated and controlled group.

Since some of the infants in both study groups were weaned prior to day 360 (i.e. completion of the study), their data on breast milk intake were not available, making it almost impossible to use a simple statistical procedure, such as repeated measures analysis. We have therefore adopted the 'maximum likelihood' (ML) analytic procedure in our study reported here. The rationale and procedure can be seen in Berk's BMDP Technical Report, No. 81, published in 1985 [14].

## **Results**

Although a total of 56 mother–baby pairs were included in the main study, data from only eight pairs (mothers who did not use systemic contraceptives, four with first-born and four with second- or later-born infants) served as controls in this study.

Anthropometric and clinical profiles, including age, weight and body mass (BMI) of these mothers were found to be almost identical (see Table 1). However, the mothers who were sterilized, as expected, had a significantly higher parity than those who were not, i.e.  $2.4 \pm 1.2$  (SD) vs  $1.7 \pm 0.91$  with  $p < 0.02$ .

The mean birth weights and birth lengths as well as those measured at subsequent follow-up intervals, were similar (see Table 3). The maximum likelihood analysis of these two sets of data indicated that they were indeed similar, and the ML calculation gave probabilities of the weights and lengths being different at 0.440 and 0.801, even when time had been taken into account.

**Table 1. Maternal anthropometric and clinical profiles on admission to the study**

	<i>Age</i>	<i>Parity</i>	<i>Height</i>	<i>Weight</i>	<i>BMI</i>
Tubectomized	27.3±4.3	2.4±1.2	150.0±7.1	47.2±5.2	20.9±2.4
<i>n</i>	12	12	12	12	12
Control	27.4±4.9	1.7±0.9	151.8±4.3	48.8±3.9	20.9±0.7
<i>n</i>	8	8	8	8	8
<i>t</i> -test	0.934	-2.74	0.406	0.476	0.98

Results are means ± SD; Tubectomized = postpartum surgical sterilization; Control = non-sterilized and non-systemic contraceptive users; *t*-test = Student's *t*-values; BMI = body mass index (wt/ht<sup>2</sup>)

**Table 2. Breastfeeding patterns**

	<i>Study day</i>					
	<i>15</i>	<i>45</i>	<i>90</i>	<i>180</i>	<i>270</i>	<i>360</i>
<i>Tubectomized</i>						
BMV	691 ± 144	787 ± 182	753 ± 166	629 ± 159	544 ± 158	389 ± 213
B/Ff	18.2±4.1	16.3±5.4	12.3±1.4	11.5±2.7	11.7±2.1	9.7 ± 2.6
TonB	161 ± 63	154 ± 94	111 ± 47	106 ± 37	119 ± 37	108 ± 45
<i>n</i>	12	12	12	12	12	11
<i>Control</i>						
BMV	603 ± 156	718 ± 181	625 ± 79	497 ± 164	430 ± 146	522 ± 159
B/Ff	15.7± 3.0	15.5± 5.4	11.7± 5.6	10.7± 4.1	11.2± 2.6	13.2± 6.4
TonB	178 ± 73	169 ± 96	111 ± 42	95 ± 50	92 ± 35	99 ± 38
<i>n</i>	8	8	8	8	6	4

Results are means ± SD; Tubectomized = postpartum surgical sterilization; Control = non-sterilized and non-systemic contraceptive users; BMV = breast milk taken in g per 24 h; B/Ff = breastfeeding frequency per 24 h; TonB = total time spent on the breast in minutes per 24 h

Breastfeeding patterns, as typified by the frequency of feeds or number of attachments to the breast in 24 h, total feeding time and the volume of breast milk transferred, were not different between the two groups ( $p = 0.639, 0.824$  and  $0.242$ ; see also Table 2). The volume of breast milk transferred was highest during the first few months postpartum, and, in the tubectomized group, this was greater than 600 grams per day up until the sixth postpartum month. Growth (as measured by attained weight and length) was also similar in the two groups (see Table 3). All but one of the tubectomized mothers continued to breastfeed their infants for the whole year of observation. The one who weaned did so only after the ninth postpartum month. In the control group, however, two infants were weaned after the sixth month, and an additional two were weaned after the ninth postpartum month.

Table 3. Infants' growth

	Study day					
	15	45	90	180	270	360
<i>Tubectomized</i>						
Wt	3.39±0.56	4.62±0.67	5.87±0.75	7.37±1.04	8.09±1.08	8.57±1.03
Lt	50.7±2.5	54.3±2.3	58.8±2.7	64.6±2.5	68.5±3.0	71.3±2.3
n	12	12	12	12	12	9
<i>Control</i>						
Wt	3.23±0.18	4.40±0.36	5.65±0.48	7.02±0.57	8.00±0.75	8.29±0.91
Lt	50.5±1.4	54.0±0.72	58.6±1.4	65.1±1.8	69.7±1.4	71.2±1.8
n	8	8	8	8	6	4

Results are means ± SD; Tubectomized = postpartum surgical sterilization; Control = non-sterilized and non-systemic contraceptive users; Wt = weight in kg; Lt = length in cm

Although the number of subjects included in this study is small, the validated precision of the methodologies for the accurate assessment of the outcome variables (volume of breast milk intake, feed frequency and time spent on the breast) allows us to conclude that the lactational performances of this group of rural northern Thai mothers was not affected by several days' delay in initiation of suckling as a result of the postpartum tubal sterilization procedure. This finding is in agreement with an earlier study in Chiang Mai which showed no significant differences in the volume of breast milk transferred over postpartum days 2–5 between infants who were united early with their mothers (mean = 3.6 hours) and those who were reunited late (mean = 25.1 hours) in accordance with routine hospital policy [7].

These results appear to differ from those reported by Dusitsin *et al.* [15] and others previously cited. Dusitsin *et al.* found a significant reduction when breast milk was removed by the infant and by Egnell electric breast pump with the help of oxytocin injection on the morning of postpartum day 7 and day 14. It may be that Dusitsin's subject belonged to the urban Bangkok population where breastfeeding behavior is likely to follow the pattern observed in many Western countries. On the other hand, in rural Thailand (a traditional Third World setting), lactation is almost always successful, wherever the mother is delivered and whenever breastfeeding is initiated. Breastfeeding is viewed as a routine, socially accepted and necessary activity, expected by every mother of every newborn baby.

The traditional pattern of numerous breastfeeding episodes may play a key role as a major determinant of the success of the outcome. It has been noted that as many as 30 separate breastfeeding episodes were observed in any 24 hours (although the mean episodes for the entire population studied was 17), and the frequency was such that, at times, it was difficult to be certain when the last feeding episode ended and the next one started. More than one third of the feedings were given during the night or sleeping hours (2000–0600). Both the number of nursing episodes and the volume of breast milk taken at night remained constant throughout the first year as the infants

still continued to sleep beside their mothers and therefore continued to have unrestricted access to the breast. The common practice of prolonged night time breastfeeding among the population studied may help to increase the physiological ability to maintain good and adequate milk production as well as lactational infertility [16] by exploiting the higher levels of prolactin secretion at night [17,18]. This is despite the fact that almost all rural northern Thai infants usually receive early supplements in the form of small quantities of rice-based preparations (a common practice in the region) similar to the traditional feeding practices of newborns in other developing countries. This type of breastfeeding has recently been classified as 'almost exclusive' by Labbok and Krasovec [19] and as 'nearly fully' by Kennedy *et al.* [16].

From about the fourth month postpartum onward when large amounts of supplementary foods were being gradually introduced, daytime breastfeeding activities started to decline and the mother also started to resume additional tasks, and to take on an increasing share of the household and field workload. The mother was no longer able to be with her infant during this period, and the infant was usually left in the house under the care of a grandparent or elder sibling [20]. The pattern thus described is the opposite of that seen in developing country settings where the infant does not usually sleep with his mother at night and may not even be in the same bedroom. Night-time breastfeeding activities, rather than those in the daytime, are usually the first to be curtailed [21].

It appears, therefore, that a pattern of intense breastfeeding activity supports prolonged and successful lactational outcome despite the absence of contact in the immediate postpartum period. It can be concluded from the foregoing discussion that routine postpartum sterilization, an important modality for effective and inexpensive contraception, especially in a Third World country like Thailand, is not incompatible with successful and prolonged breastfeeding.

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### References

1. Salayiya, E.M., Easton, P.M. and Carter, J.I. (1978). Duration of breastfeeding after early initiation and frequent feeding. *Lancet*, **2**, 1141-1143
2. Taylor, E.M., Easton, P.M. and Carter, J.I. (1986). Early sucking and prolonged breastfeeding. *Am. J. Dis. Child*, **140**, 151-154
3. Thomson, M.E., Hartsock, T.G. and Larson, C. (1979). The importance of immediate postnatal contact: its effect on breastfeeding. *Can. Fam. Physician*, **25**, 1374-1378

4. World Health Organization (WHO) (1981). Contemporary patterns of breastfeeding: report on the WHO Collaborative Study on Breast Feeding. Geneva, p. 211
5. Population Reports Series J, No. 24 (1981). Breastfeeding, fertility and family planning. The Johns Hopkins University Press, Baltimore, MD, p. 549
6. Woolridge, M.W., Greasley, V. and Silpisornkosol, S. (1985). The initiation of lactation: the effect of early versus delayed suckling on milk intake in the first week postpartum: A study in Chiang Mai, northern Thailand. *Early Hum. Devel.*, **12**, 269–278
7. Pitakthepsombat, P. and Vibulseth, S. (1987). Factors influencing the sterilization in the rural northeast of Thailand. In: Proceedings of the 6th Fertility Research Investigators' Meeting of the Fertility Research Association of Thailand and the National Family Planning Programme, Family Health Division, Royal Thai Ministry of Public Health, Government of Thailand, pp. 149–159
8. Analysis and Evaluation, National Family Planning Board, Royal Thai Ministry of Public Health, Government of Thailand National Family Planning Annual Report, 1988 (mimeograph, May 1989)
9. Surgical sterilization as one of the highly favored contraceptive modalities for Thailand. In: Priority Statements in the Sixth Five Year Plan (1986–1991), Bangkok, Thailand, 1988. National Family Planning Programme, Division of Maternal and Child Health, Royal Thai Ministry of Public Health, Government of Thailand
10. Woolridge, N.W., Jackson, D.A., Imong, S.M., Yootabutra, Y. and Amatayakul, K. (1987). Indirect test weighing: A non-intrusive technique for estimating night-time breast milk intake. *Hum. Nutr. Clin. Nutr.*, **41C**, 347–361
11. Imong, S.M., Jackson, D.A., Wongsawasdi, L. et al. (1989). The predictor of breast milk intake in rural northern Thailand. *J. Paediatr. Gastroenterol. Nutr.*, **8**, 359–370
12. Imong, S.M., Jackson, D.A., Woolridge, M.W. et al. (1988). Indirect test-weighing: a method for measuring overnight breast milk intake in the field. *J. Paediatr. Gastroenterol. Nutr.*, **7**, 699–706
13. Drewett, R.F., Woolridge, M.W., Greasley, V., McCleod, C.N., Hewison, J. and Baum, J.D. (1984). Evaluating breast milk intake by test-weighing: a portable electronic balance suitable for field community studies. *Early Hum. Devel.*, **10**, 123–126
14. Berk, K. (1985). In: BMDP Technical Report No. 81. *Computing for Incomplete Repeated Measures*. BMDP Statistical Software, Los Angeles, California
15. Dusitsin, N., Chimpooteawee, S., Taneypon, M. and Boonsiri, B. (1979). The effect of postpartum tubal ligation on breastfeeding. *J. Thai Assoc. Vol. Steril.*, **1**, 51–57
16. Kennedy, K.I., Rivera, R. and McNeilly, A.S. (1989). Consensus statement on the use of breastfeeding as a family planning method. *Contraception*, **39**, 477–495
17. Brunner, D.L., Van der Laan, E.F. and Van der Laan, W.P. (1978). Prolactin levels in nursing mothers. *Am. J. Obstet. Gynecol.*, **131**, 250–252
18. Diaz, S., Seron-ferre, M., Cardenas, H. et al., (1989). Circadian variation in basal plasma prolactin, prolactin response to suckling and the length of amenorrhea in nursing women. *J. Clin. Endocrinol. Metab.*, **68**, 946
19. Labbok, M. and Krasovec, K. (1990). Toward consistency in breastfeeding. *Definition Series in Family Planning*, **21**, 226–230
20. Amatayakul, K., Chiowanich, P., Wongsawasdi, L. et al. (1989). Breastfeeding practices in the developing world. *Int. J. Gynecol. Obstet.*, **1(Suppl)**, 129–132
21. Dewey, K.G. and Lonner, B. (1983). Breast milk intake: variations in breastfeeding practices. *Am. J. Clin. Nutr.*, **38**, 152–153

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## Resumé

Cette étude a été entreprise dans les populations rurales du nord de la Thaïlande, pour déterminer si la ligature des trompes pratiquée dans les quelques jours qui suivent l'accouchement, et associée à un retard du début de l'allaitement au sein, exerce une influence perturbatrice sur l'établissement normal de la lactation.

La mise en train de lactation chez 12 mères de la région rurale du nord de la Thaïlande n'a pas été affectée par le retard apporté à réunir la mère et le nouveau-né après une intervention pour stérilisation tubaire au cours du post-partum, par comparaison avec un groupe de 8 mères en bonne santé et nouveaux-nés. Le volume du lait transmis à l'enfant, la fréquence des allaitements au sein et le temps total

d'allaitement au sein ont été analogues aux jours 15, 45, 90, 180 et 360 après l'accouchement. Ce résultat laisse penser que ce type d'activité intense d'allaitement au sein par ce groupe de mères a une plus grande influence sur la longueur et le succès de la lactation que le contact précoce pendant la période du postpartum.

### **Resumen**

Este estudio se realizó para determinar en las poblaciones rurales del norte de Tailandia si la ligadura de las trompas practicada a los pocos días del parto, y asociada con un retraso del comienzo del amamantamiento, ejerce una influencia perturbadora sobre el establecimiento normal de la lactación.

La lactación en 12 madres de la región rural del norte de Tailandia no se vio afectada por el retraso en reunir a la madre con el recién nacido tras una intervención para la esterilización tubaria durante el posparto, en comparación con un grupo de 8 madres y recién nacidos en buen estado de salud. El volumen de leche transferida al bebé, la frecuencia del amamantamiento y el tiempo total de amamantamiento fueron similares en los días 15, 45, 90, 180 y 360 después del parto. Este resultado hace pensar que este tipo de actividad intensa de amamantamiento por parte de este grupo de madres tiene una influencia mayor sobre la prolongación y el éxito de la lactación que el contacto precoz durante el posparto.