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## Breastfeeding in Preterm and Term Twins—Maternal Factors Associated With Early Cessation: A Population-Based Study

Åsa Östlund, RN, MSc, Maria Nordström, RN, MSc, Fiona Dykes, RM, PhD, and Renée Flacking, RN, PhD

### Abstract

To investigate the duration of breastfeeding and the impact of maternal factors for cessation of breastfeeding in twin infants, the authors undertook a population-based cohort study. Breastfeeding data obtained from Child Health Centres were matched with data on infant and maternal demographics from Swedish national registers. A total of 1,657 twins were included, of whom 695 were born preterm. Breastfeeding frequencies in preterm twins were 79% at 2 months, 58% at 4 months, 39% at 6 months, 14% at 9 months, and 6% at 12 months. In term twins, the corresponding frequencies were 84%, 63%, 45%, 18%, and 6%, respectively. In both preterm and term mothers, mothers who had a lower educational level or smoked at first antenatal care visit were subject to earlier cessation of breastfeeding by 6 months of age. In addition, in mothers of term infants, mothers who were < 23 years old or primiparous had a higher risk for cessation of breastfeeding before 6 months. Thus, mothers of twins have a good potential to breastfeed, but additional support is needed for those more susceptible to early cessation of breastfeeding. *J Hum Lact.* 26(3):235-241.

**Keywords:** multiple births, breastfeeding duration, premature infants, breastfeeding cessation, Sweden, long-term breastfeeding

### Background

The health benefits of breastfeeding in term infants are well established.<sup>1</sup> In preterm infants (< 37 gestational weeks), the beneficial effects on nutritional, immunological, and cognitive outcomes appear to be even more pronounced.<sup>2</sup> Thus, in both preterm and term infants, international guidelines recommend exclusive breastfeeding for 6 months and sustained breastfeeding with additional supplements up to 2 years or beyond.<sup>3,4</sup>

Sweden is one of the countries with the highest breastfeeding rates in the world, with about 70% of all infants being breastfed at 6 months.<sup>5</sup> In preterm infants, the breastfeeding frequency (exclusive and partial) at 6 months is approximately 60%.<sup>6</sup> In singleton infants, many factors influence the initiation of lactation as well as the initiation and duration of breastfeeding. Women least likely to breastfeed are young, less educated, and unsupported by the partner or other informal network members.<sup>6-9</sup> In addition, it is well recognized that women who smoke have lower intention to breastfeed and are less likely to breastfeed their infants compared to non-smokers.<sup>7,10,11</sup> Other maternal factors such as parity (primiparous vs multiparous), employment (employed vs unemployed), and ethnicity may be associated with breastfeeding cessation.<sup>6,12-16</sup>

About 3% of all births in the United States are multiple births,<sup>17</sup> and within this group, the proportion of infants born preterm or with a low birth weight (< 2500 g) is higher compared to singletons.<sup>17,18</sup> Very few studies have focused on the duration of breastfeeding in twin infants. In one of the few studies performed, the US study undertaken by Damato and colleagues<sup>19</sup> showed that 89% of the mothers initiated breastfeeding. Of those mothers who initiated breastfeeding, 39%

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were still breastfeeding at 6 months. It has also been shown that twin infants are less likely to be exclusively breastfed at 3 to 6 months compared to singleton infants,<sup>20,21</sup> even though mothers of twins can produce enough breast milk to meet the nutritional needs for their infants.<sup>22</sup> The only identified published study with an aim to investigate the effects of maternal factors on breastfeeding duration in twin infants showed no association between breastfeeding and maternal factors such as mother's age, education level, parity, and infants' gestational age at birth.<sup>23</sup> However, in that study, 42% of the infants were born preterm, which may have affected the results. Hence, there is a need for a large population-based study in which the breastfeeding duration in term and preterm twins is investigated separately and where potential risk factors for earlier breastfeeding cessation can be identified. Thus, the aim of this study was to investigate the duration of breastfeeding in preterm and term twins up to 1 year of infants' age and to explore the impact of maternal factors on cessation of breastfeeding before 6 months of age.

## Methods

### Sample

This study involved retrospective analysis of breastfeeding data from a population-based cohort, in which the participants were obtained from 2 registers in a step-wise process. First, all infants registered in the Child Health Centre (CHC) registers on breastfeeding in the counties of Örebro and Uppsala from 1993-2001 were selected. In connection with scheduled visits at the CHC, in which almost 100% of all infants are enrolled, the mothers are asked whether the infant is breastfed, and the CHC nurse records the answer; these findings are then registered at the county Child Health Services. A total of 57 607 infants were identified in the CHC's registers, and on the basis of their personal identity numbers, data on 55 672 infants were obtained at the Medical Birth Registry (MBR) in Sweden. Second, only mothers with twins were included. Of the 1760 twins identified, 48 infants lacked a twin sibling in the data set and were therefore excluded. Of the remaining 1712 infants, 55 infants lacked data on breastfeeding at 2 to 12 months of age and were thus excluded. The final sample consisted of 1657 twins, 695 twins born preterm (< 37 gestational weeks) and 962 twins born at term (≥ 37 gestational weeks). The uneven number is explained by the fact that, in some of the twin couples

(n = 13), one of them lacked breastfeeding data and was hence excluded. The research ethics committee of the Medical Faculty at Uppsala University approved the study.

### Data Sources and Included Variables

**Breastfeeding data.** In Sweden, the frequency of breastfeeding has been registered nationally for several decades; breastfeeding is defined by the Swedish National Board of Health and Welfare as the infant being fed with breast milk. In this study, the incidence of breastfeeding is presented at 2, 4, 6, 9, and 12 months of infants' postnatal age. For the purposes of this study, "breastfeeding" includes infants who were exclusively or partially breastfed. Missing data on occurrence of breastfeeding were replaced by "no breastfeeding" if the infant had not been breastfed at the point in time before the missing value. Data were not replaced for infants who were breastfed and subsequently lacked data.

**Maternal factors.** The maternal factors investigated were maternal educational level, parity, maternal age, ethnicity, smoking, civil status, and delivery method. Data on educational level were obtained from Statistics Sweden (SCB), categorized in 2 groups: upper secondary school or less and higher education. SCB is a national registry in which data are compiled from different sources such as tax returns and the Educational Register and covers the entire population of Sweden. Data were also obtained from the MBR, a national registry with information on mothers, deliveries, and newborn infants. Data on parity were categorized as being primiparous or multiparous, and the mothers' age at delivery was categorized into 4 groups: ≤ 23, 24-28, 29-33, ≥ 34. Ethnicity was defined as being born in Sweden or not and civil status as cohabiting or living as a single parent. Delivery method was categorized into vaginal delivery or caesarean section. Data on smoking at first antenatal care visit were also obtained from the MBR and compared to those not smoking at the first antenatal care visit. Fewer than 2% of the data were missing for parity, mother's age, ethnicity, and delivery method in both preterm and term twins. Regarding education level, 3% of the preterm and 2% of the term infants' mothers lacked data. A higher number of missing data concerned smoking at first antenatal care visit in mothers of preterm and term twins (10% and 8%, respectively) and civil status (13% and 9%, respectively).

Table 1. Distribution of the Characteristics of Preterm (n = 695) and Term (n = 962) Twins and Their Mothers

Characteristics	Preterm	Term
	No. (%)	No. (%)
Maternal educational level		
Upper secondary school or less	463 (67)	630 (66)
Higher education	212 (31)	314 (33)
Civil status		
Single	18 (3)	31 (3)
Cohabiting	588 (85)	841 (87)
Ethnicity		
Not born in Sweden	85 (12)	153 (16)
Born in Sweden	604 (87)	806 (84)
Mother's age, y		
≤ 23	51 (7)	38 (4)
24-28	202 (29)	270 (28)
29-33	261 (38)	386 (40)
≥ 34	181 (26)	268 (28)
Smoker		
Yes	84 (12)	127 (13)
No	545 (78)	757 (79)
Parity		
Primiparous	388 (56)	450 (47)
Multiparous	307 (44)	512 (53)
Delivery method		
Cesarean section	312 (45)	387 (40)
Vaginal	383 (55)	575 (60)

**Data Analyses**

Data were analyzed using the statistical package SPSS 14.0 for Windows (IBM Company, Chicago, Illinois), and *P* values < .05 were taken as the level of statistical significance. Descriptive statistics were tabulated and chi-square tests performed to examine differences in breastfeeding frequencies at 2, 4, 6, 9, and 12 months. Logistic regression analyses were used to investigate the effect of maternal factors on cessation of breastfeeding before the infants' age of 6 months. In the first step, the effect of each of the maternal factors on weaning was investigated. In the second step, all maternal factors that showed a statistical significance in the unadjusted analysis were mutually adjusted for one and other. The Hosmer-Lemeshow test was used to test if the overall model fit was good. The results are presented as odds ratio (OR) with a 95% confidence interval (CI).

**Results**

**Characteristics**

In Table 1, the distribution of characteristics of mothers of preterm and term twins is presented. Among

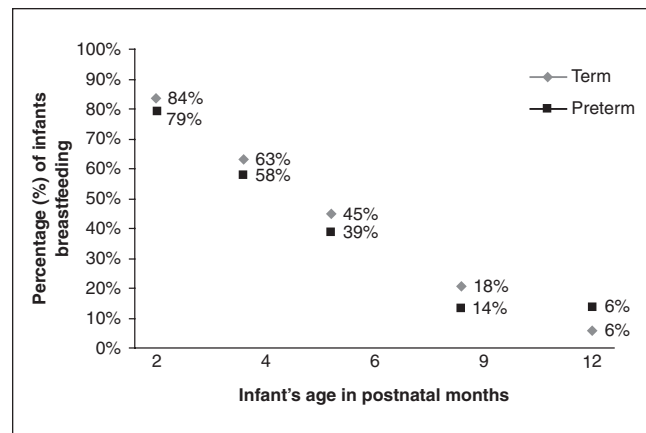


Figure 1. Breastfeeding frequency (%) at 2 to 12 months of age in preterm (n = 695) and term (n = 962) twins.

the preterm twins, the gestational age at birth ranged from 24 to 36 weeks, with a median of 35 weeks. Term twins' gestational age at birth ranged from 37 to 43 weeks with a median of 38 weeks. The preterm twins weighed 483 to 3735 g with  $\bar{x} \pm SD$  of  $2211 \pm 566$  g, and the term twins weighed 1612 to 4220 g with  $\bar{x} \pm SD$  of  $2908 \pm 409$  g.

**Breastfeeding Duration in Preterm and Term Twins**

Figure 1 presents the breastfeeding frequency at 2, 4, 6, 9, and 12 months in mothers of preterm (n = 695-640) and term (n = 962-855) twins. Significantly fewer preterm twins were breastfed at 2, 4, 6, and 9 months compared to term twins. In adjusted analyses, preterm twins showed an increased risk of being weaned compared to term twins before the age of 2 months (OR = 1.36; 95% CI: 1.06-1.75), 4 months (OR = 1.28; CI: 1.05-1.57), 6 months (OR = 1.30; CI: 1.06-1.58), and 9 months (OR = 1.43; CI: 1.09-1.88). At 12 months, there was no difference in breastfeeding; 6% of the preterm and 6% of the term twins were breastfed. The percentage of mothers who ceased breastfeeding between the study intervals was similar in the term and preterm groups. Of the mothers, 21% ceased breastfeeding in both groups between 2 and 4 months, 18% in the term and 19% in the preterm groups between 4 and 6 months, 27% and 25% between 6 and 9 months, and 12% and 8% between 9 and 12 months, respectively.

Table 2. Odds Ratios (ORs) for Being Weaned From Breastfeeding Before the Infant's Postnatal Age of 6 Months in Preterm Twins (n = 695), in Unadjusted and Adjusted Logistic Regression

	No. of Cases	Proportion of Infants Who Had Been Weaned, %	Unadjusted OR	Adjusted OR
			OR (95% CI)	OR (95% CI)
Maternal educational level				
Upper secondary school or less	457	68	2.55 <sup>a</sup> (1.83-3.57)	1.97 <sup>a</sup> (1.36-2.86)
Higher education	210	45	1.00	1.00
Civil status				
Single	18	67	1.28 (0.48-3.47)	
Cohabiting	578	61	1.00	
Ethnicity				
Not born in Sweden	80	60	0.98 (0.61-1.57)	
Born in Sweden	599	61	1.00	
Mother's age, y				
≤ 23	51	77	2.74 <sup>a</sup> (1.35-5.59)	1.96 (0.82-4.71)
24-28	199	66	2.38 <sup>a</sup> (1.19-4.75)	1.87 (0.80-4.41)
29-33	258	58	1.69 (0.83-3.43)	1.40 (0.59-3.31)
≥ 34	177	54	1.00	1.00
Smoker				
Yes	82	87	4.78 <sup>a</sup> (2.48-9.23)	4.09 <sup>a</sup> (2.09-8.01)
No	538	57	1.00	1.00
Parity				
Primiparous	383	60	0.98 (0.72-1.33)	
Multiparous	302	61	1.00	
Delivery method				
Cesarean section	305	64	1.32 (0.97-1.80)	
Vaginal	380	58	1.00	

Adjusted OR includes adjustment for maternal educational level, mother's age, and smoking. CI, confidence interval.

<sup>a</sup> $P < .05$ .

### Impact of Maternal Factors for Being Weaned From Breastfeeding Before 6 Months of Age

Table 2 presents the results from the unadjusted and adjusted logistic regression analyses in preterm twins. In the unadjusted analyses, an educational level of upper secondary school or less, lower maternal age, and smoking at first antenatal care visit (hereafter referred to as "smoked") were individually associated with cessation of breastfeeding before 6 months. In the adjusted logistic regression analysis, in which educational level, maternal age, and smoking were mutually adjusted, the results showed that twins whose mothers had an education level of upper secondary school or less (OR = 1.97; CI: 1.36-2.86) or whose mothers smoked (OR = 4.09; CI: 2.09-8.01) had a significant risk for cessation of breastfeeding before 6 months. The impact between maternal age and weaning attenuated and became nonsignificant. The Hosmer-Lemeshow test showed  $P = .135$ , indicating that the numbers of cessation from breastfeeding were not significantly different from those predicted by the model and that the overall model fit was good.

Table 3 presents the results from the unadjusted and adjusted logistic regression analyses in term twins.

The results of the unadjusted analyses showed that an educational level of upper secondary school or less, being younger than 28 years, smoking at first antenatal care visit, and being primiparous were individually associated with weaning before 6 months. In the adjusted logistic regression analysis, in which educational level, maternal age, smoking, and parity were mutually adjusted for, twins whose mothers had an education level of upper secondary school or less (OR = 2.12; CI: 1.55-2.88), were younger than 23 years (OR = 2.64; CI: 1.09-6.37), smoked (OR = 3.46; CI: 2.15-5.55), or were primiparous (OR = 1.71; CI: 1.28-2.30) had a significant risk for breastfeeding cessation before 6 months. The Hosmer-Lemeshow test showed  $P = .204$ , indicating that the numbers of cessation from breastfeeding were not significantly different from those predicted by the model and that the overall model fit was good.

### Discussion

This study provides the first population-based data on breastfeeding duration up to 1 year of age in Swedish preterm and term twins. In addition, the impact of maternal



Table 3. Odds Ratios (ORs) for Being Weaned From Breastfeeding Before the Infant's Postnatal Age of 6 Months in Term Twins (n = 962), in Unadjusted and Adjusted Logistic Regression

	No. of Cases	Proportion of Infants Who Had Been Weaned, %	Unadjusted OR OR (95% CI)	Adjusted OR OR (95% CI)
Maternal educational level				
Upper secondary school or less	618	61	2.33 <sup>a</sup> (1.76-3.07)	2.12 <sup>a</sup> (1.55-2.88)
Higher education	312	40	1.00	1.00
Civil status				
Single	29	55	1.00 (0.47-2.1)	
Cohabiting	829	55	1.00	
Ethnicity				
Not born in Sweden	151	58	1.17 (0.83-1.67)	
Born in Sweden	794	54	1.00	
Mother's age, y				
≤ 23	38	74	3.57 <sup>a</sup> (1.67-7.65)	2.64 <sup>a</sup> (1.09-6.37)
24-28	267	58	2.16 <sup>a</sup> (1.02-4.57)	1.40 (0.59-3.32)
29-33	379	57	1.99 (0.93-4.27)	1.74 (0.73-4.16)
≥ 34	264	44	1.00	1.00
Smoker				
Yes	126	78	3.48 <sup>a</sup> (2.23-5.43)	3.46 <sup>a</sup> (2.15-5.55)
No	744	50	1.00	1.00
Parity				
Primiparous	445	58	1.33 <sup>a</sup> (1.03-1.72)	1.71 <sup>a</sup> (1.28-2.30)
Multiparous	503	51	1.00	1.00
Delivery method				
Cesarean section	379	55	1.06 (0.82-1.38)	
Vaginal	569	54	1.00	

Adjusted OR includes adjustment for adjusted for maternal educational level, mother's age, smoking, and parity. CI, confidence interval.

<sup>a</sup> $P < .05$ .

factors, upon cessation of breastfeeding before 6 months of age, was explored in preterm and term twins. The main strengths of this register-based study lie in its coverage of the whole population in 2 counties and the provision of longitudinal breastfeeding data.

The findings from our study show that a high percentage of mothers of twins initiate breastfeeding, regardless of a preterm or term delivery; about 80% of all twins were breastfed at 2 months. Despite this high rate of breastfeeding during the first months, a large number of preterm and term twins were weaned before 6 months. Early cessation of breastfeeding in twins may have several potential explanations. It has been shown that mothers of twin infants may experience breastfeeding as time-consuming and stressful,<sup>19</sup> and stress in mothers may affect the release of oxytocin,<sup>24,25</sup> which may be associated with a negative effect on breastfeeding. It has also been suggested that, to reduce the pressure on breastfeeding mothers, it is of importance that fathers participate, encourage, and support the mother to breastfeed.<sup>26,27</sup> It may be possible that the fathers' role and support are even more important when there are multiple births. To facilitate long breastfeeding duration in twins, good prenatal preparation and psychological

and practical support in the postpartum period for mothers of breastfeeding twin infants are important.

Furthermore, our results showed that significantly fewer preterm twins were breastfed at 2 to 9 months compared to term twins. However, the percentages of infants who ceased breastfeeding between 2-4, 4-6, 6-9, and 9-12 months are equal among the preterm and the term group. Hence, once breastfeeding is initiated, the decline in breastfeeding is equivalent in the groups of preterm and term twins. These findings highlight the significance of early support for initiation of breastfeeding, especially in mothers of the preterm twins. Support for initiation of breastfeeding in preterm babies needs to include facilitation of maternal confidence in their ability to breastfeed.<sup>28</sup> Subsequently, strategies that enhance the mother's means to experience a trust in herself and her babies such as early and continuous skin-to-skin contact, nonseparation, and being together in privacy may promote short- and long-term breast-feeding.<sup>28-31</sup> It would have been desirable to describe the rates of exclusive and partial breastfeeding. However, because of varying definitions of exclusive breastfeeding during the study period, such analyses were not feasible.

Findings from our study indicate that maternal factors such as educational level, smoking, and maternal age were all individually related to cessation of breastfeeding before 6 months of age. In our study, a low maternal educational level was strongly related to early cessation of breastfeeding, confirmed by previous studies in preterm and term singletons.<sup>7,8,32,33</sup> Regarding education, one explanation for the association with duration of breastfeeding could be that a lower education entails a situation in which the person has less status and less control and power, which in turn may produce stress and lower self-esteem.<sup>34</sup> It has also been suggested that high self-esteem and breastfeeding are highly connected.<sup>35-37</sup>

Smoking in mothers is often associated with lower levels of education.<sup>38</sup> In our study, these maternal factors were significantly related to breastfeeding frequency at 6 months, even when adjustments for all maternal factors were made. Potential explanations for lower breastfeeding frequencies could be that mothers who smoke produce less breast milk or might be less motivated.<sup>39</sup> It could also be an effect of the mother's fear of a potential threat of harming her infants by smoking and breastfeeding.

This study also indicates that term twin infants had longer breastfeeding duration if the mother was multiparous. These findings confirm earlier studies on term singletons and the impact of parity on breastfeeding duration<sup>20,33,40</sup> but is contrary to others.<sup>13,41,42</sup> However, our findings showed that if the infants are born preterm, being multiparous is not as beneficial. These findings may reflect that multiparous mothers of preterm twins may experience a greater deal of exhaustion and feelings of being torn between older children at home and newborns admitted to a neonatal unit,<sup>29</sup> whereas primiparous mothers of preterm twins may have more time for the infants and can be focused on breastfeeding.

In conclusion, findings from this study show that, although a large number of Swedish twins were breastfed at 2 months, only 45% of the term and 39% of the preterm twins were breastfed at 6 months. In addition, although significantly fewer preterm twins were breastfed at 2, 4, 6, and 9 months compared to term twins, the percentage of mothers actually ceasing to breastfeed between each assessed point of time was equivalent between the groups. Furthermore, twins whose mothers had an education level of upper secondary school or less and/or were smokers at the first antenatal care

visit were more likely to have ceased breastfeeding before 6 months of postnatal age. These results bring concern and highlight mothers with lower levels of education and those who smoke as priority groups that need more support and guidance from family and professionals both pre- and postnatally.

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