

# Breast-feeding Duration: Early Weaning—Do We Sufficiently Consider the Risk Factors?

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## ABSTRACT

**Background:** Breast-feeding is the recommended form of nutrition for the first 6 months. This target is unmet, however, in most industrialized regions. We evaluated aspects of breast-feeding in a cohort of mother-baby dyads.

**Methods:** Breast-feeding practices in 555 mother-baby dyads were prospectively studied for 24 months (personal interview at birth and 7 structured telephone interviews).

**Results:** Of the babies, 71.3% were fully breast-fed on discharge from maternity hospitals and 11.9% were partially breast-fed. Median breast-feeding duration was 6.93 (interquartile range 2.57–11.00) months; for full (exclusive) breast-feeding 5.62 (interquartile range 3.12–7.77) months; 61.7% received supplemental feedings during the first days of life. Breast-feeding duration in babies receiving supplemental feedings was significantly shorter (median 5.06 months versus 8.21 months,  $P < 0.001$ ). At 6 months, 9.4% of the mothers were exclusively and 39.5% partially breast-feeding. Risk factors for early weaning were early supplemental feedings (odds ratio [OR] 2.87, 95% CI 1.65–4.98), perceived milk insufficiency (OR 7.35, 95% CI 3.59–15.07), low breast-feeding self-efficacy (a mother's self-confidence in her ability to adequately feed her baby) (OR 3.42, 95% CI 1.48–7.94), lower maternal age (OR 3.89, 95% CI 1.45–10.46), and lower education level of the mother (OR 7.30, 95% CI 2.93–18.20).

**Conclusions:** The recommended full breast-feeding duration of the first 6 months of life was not reached. Sociodemographic variables and factors directly related to breast-feeding practices play an important role on breast-feeding duration/weaning in our region. Understanding risk factors will provide insights to give better support to mothers and prevent short- and long-term morbidity following early weaning.

## What Is Known

- Breast-feeding is the recommended nutrition for the first 6 months.
- This target is unmet in most industrialized regions.
- The risk factors for early weaning are not sufficiently considered.

## What Is New

- Risk factors for early weaning have possibly escaped attention when considering tools to achieve the recommended breast-feeding duration and give adequate support to mothers.
- Risk factors were early supplemental feedings, perceived milk insufficiency, low breast-feeding self-efficacy, lower maternal age, and lower education level of the mother.
- Low breast-feeding self-efficacy is not regularly considered a risk factor.

**Key Words:** breast-feeding, breast-feeding self-efficacy, early supplementary feedings, perceived milk insufficiency, weaning

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The positive effects of breast-feeding on short- and long-term health—both for infants and mothers—are beyond question (1,2).

Breast-feeding lowers morbidity and mortality, not only in developing but also in industrialized parts of the world (3,4). One example is the apparently reduced risk of obesity in breast-fed infants in a dose-effect manner (ie, the longer the breast-feeding, the less risk of overweight/obesity) (3,4). These known positive effects make breast-feeding duration a health care issue (1,5–7).

The target of 6-month full breast-feeding duration is far from being met in most industrialized regions, especially in the Middle and Southern European countries (8–12). “Fully breast-fed” = “exclusively breast-fed” is defined as no other nutrition or fluids besides breast milk; “partially breast-fed” is defined as some other nutrition or fluids.

The timing of the introduction of complementary foods (defined as foods other than breast milk or formula) has been the subject of ongoing discussion. It suffices to state that it is widely accepted at around age 6 months, with recommendations ranging between 17 and 26 weeks of age (6). In Germany, in 1997/1998, 48% of mothers were breast-feeding at age 6 months, and only 10% did so fully (9). In 2006, in an Austrian cohort, the figures

were 55% and 10%, respectively (13). Thus, in a period of ~10 years not much changed with regard to breast-feeding rates and duration (9,10,13). Information campaigns, targeted training of health care professionals, and support for breast-feeding mothers can improve the early involuntary weaning situation (herein defined as no more breast-feeding at all) (3,4). In addition, the Baby-Friendly Hospital Initiative, developed by the United Nations Children's Fund and the World Health Organization, in 10 steps advises hospitals on breast-feeding support (2). The question of involuntary early weaning, before the 26th week of life, is an important health policy issue and has implications for both infants and mothers. In this study, we conducted structured telephone interviews to prospectively analyze the course of 555 mother-baby dyads during the first 24 months of life with regard to aspects of nutrition and infant care. We wanted to better understand the factors that influence weaning in our region and find opportunities for applying health care policies to improve results in this aspect.

## METHODS

The "Study on the Nutrition of Infants and Toddlers in Tyrol" ("Studie zur Ernährung des Säuglings und Kleinkindes in Tirol") is a multicenter, prospective, and open study. The cohort comprises 555 mother-baby dyads from 8 of the 9 obstetric departments in the Austrian State of Tyrol, who after informed written consent of the mothers were prospectively studied for the first 24 months of life (personal interview at birth, then 7 telephone interviews at ages 2 and 6 weeks and 3, 6, 12, 18, and 24 months). The babies were born between June and December 2009. Residency in Tyrol during birth and the first 2 years of life was the inclusion criterion. The first interview was conducted at the maternity hospital, within the first 4 days of life. Information on hospital stay, pregnancy, and birth was given by the hospital personnel and the mothers themselves as part of this interview. The structured telephone interviews were conducted at the set times by medical staff and medical students. Every interview included questions on current nutrition (amount, frequency, and kind of feedings), breast-feeding behavior, weaning (defined as no more breast-feeding at all), supplemental feedings, amount and kind of complementary foods, medical problems in mother and/or child, and general aspects of infant care (ie, bottles and dummies used, sleeping place). Mothers were asked at each of the interviews whether weaning had taken place since the last interview. Babies not born in Tyrol and families who resided outside Tyrol were excluded.

## Definitions

"Fully breast-fed" = "exclusively breast-fed" is defined as no other nutrition or fluids besides breast milk; "partially breast-fed" is defined as some other nutrition or fluids; "supplemental feeding" is defined as any form of formula or fluid other than breast milk; "weaning" is defined as no more breast-feeding at all.

Breast-feeding self-efficacy is defined as the self-confidence of a mother in her ability to adequately feed her baby.

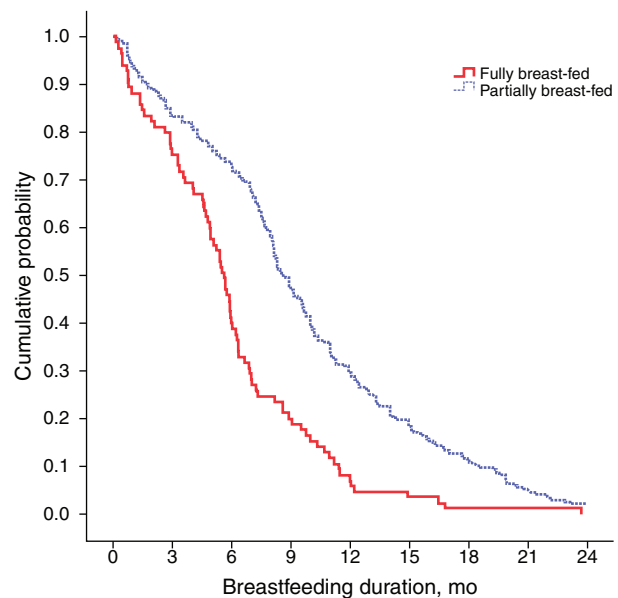
Perceived milk insufficiency is the belief held by the breast-feeding mother that the amount or quality of her milk is insufficient to meet her baby's needs.

## Data Collection and Statistical Analysis

**AQ5** Data were collected on paper interview forms and transcribed into a password-protected access database developed for the study.

**AQ6** Statistical analyses were conducted with IBM SPSS Statistics, version 21. Data are presented as medians (interquartile ranges).

**AQ7** Categorical variables are presented as percentages (valid percents).



**FIGURE 1.** Breast-feeding duration during the first 24 months of life depicted in a Kaplan-Meier curve. X-axis: timeline for breast-feeding duration from 0 to 24 months; y-axis: cumulative probability. Full line is "fully breastfed" (exclusively breastfed); dotted line is "partially breastfed."

Group comparisons were performed using *t* test or Mann-Whitney *U* test, when appropriate. Kaplan-Meier methods were used to describe weaning over time (Fig. 1). To assess the risk factors for early weaning, subjects were divided into 2 breast-feeding duration groups (<6 and ≥6 months). The latter was used as the outcome in logistic regression models. Univariate logistic regression analysis was performed for all factors found to be associated with early weaning, followed by a multivariate logistic regression analysis with factors found to be associated with early weaning. Factors entered in the models were birth weight, early supplemental feedings, smoking during pregnancy, mode of delivery, highest maternal education level, weaning reasons, maternal age, time to first latch-on, country of birth, and parity.

At each of the 7 telephone interviews, mothers were asked whether weaning had taken place since the last interview. If the answer was "yes," they were asked for the reason (Table 1). For statistical analysis, weaning reasons were stratified into 3 categories being weaning related to perceived milk insufficiency (87/555 mothers), low breast-feeding self-efficacy (39/555), and not specified/other reasons (318/555). The category "perceived milk insufficiency" implied clear mentioning of the perception "too little milk." The category "low breast-feeding self-efficacy" comprises mothers who, for example, mentioned issues such as bad former breast-feeding experiences, thoughts that bottle-feeding would improve the child's sleep duration or that the child would accept complementary feeds better than breast-feeding/mother's milk.

Results with  $P < 0.05$  were considered statistically significant. The study was approved by the ethics committee of Innsbruck Medical University (Innsbruck, Austria).

## RESULTS

The cohort comprised 555 mother-baby dyads, corresponding to 8.1% of total births in Tyrol in 2009 ( $n = 6848$ ) and 8.8% of term babies ( $n = 6281$ ). Of these, 281 were male (50.6%) and 274 were female (49.4%). Age distribution, current living situation,

TABLE 1. Reasons for weaning given at the various interview times (at 2 and 6 weeks, 3, 6, 12, 18, and 24 months) given in numbers of mothers

	2 wk	6 wk	3 mo	6 mo	12 mo	18 mo	24 mo
Personal reasons	42	26	11	40	58	29	0
Other reasons	27	33	33	51	44	14	8
Medical problems	23	18	9	26	10	6	3
Child weaned itself	1	1	3	19	44	11	1
Child feeds itself	0	0	0	5	26	2	6
Psychological burden	8	4	7	1	2	0	0
Back to work	0	1	1	3	5	3	2
Too little support	1	0	1	3	3	1	0
Too little information	0	0	1	3	2	0	0
Number of mothers who stopped breast-feeding	67	54	42	109	141	38	8
Total number of mothers interviewed at given time point	342	446	483	535	507	501	487

Because not all mothers could be reached for every interview, the total number of mothers varies.

education of mothers, country of birth, and smoking during pregnancy are summarized in Table 2.

In summary, age distribution did not differ from the general birth statistics for Tyrol, whereas the level of education was higher than that of the general population, as is generally seen in interview-based studies. For comparison with our cohort (Table 2), from the 706,873 inhabitants in Tyrol in 2009, 89.3% were Austrian citizens, 3.5% German, 2.0% citizens of another European Union country, 2.5% came from Ex-Yugoslavia, 1.7% from Turkey, and 1.0% from other countries (data from the Tyrolean birth registry). For the year 2009, the age distribution of mothers was as follows: 0.3% of mothers were <18 years, the proportion of mothers between 35 and 39 years was 19%, and the proportion of mothers >40 years was 5%. Half (49%) of the mothers were having their first child, and 70% were working before pregnancy. In 2013, 21% of citizens between 25 and 64 years of age had an academic degree (high school/university).

At discharge, on day 4 of life, 71.3% (300/421) of mothers were fully and 11.9% (50/421) partially breast-feeding. The breast-feeding proportions during 24 months are depicted in Table 3 and Figure 1. At the 6-month interview, 9.4% (50/534) of the mothers were fully and 39.5% (211/534) of the mothers were partially breast-feeding. Because not all mothers could be reached for every interview, the total number of mothers varies (Table 1).

The percentages of breast-feeding mothers during the first 24 months are depicted in a Kaplan-Meier curve (Fig. 1). The first significant drop in breast-feeding proportions occurred in the first 4 weeks, indicating the sensitivity of this early period with regard to influences on breast-feeding.

In total, the median breast-feeding duration was 6.93 (interquartile range 2.57–11.00) months for both exclusive and partial breast-feeding. For exclusive breast-feeding, the duration was 5.62 (interquartile range 3.12–7.77) months, and for partial breast-feeding 8.61 (interquartile range 5.39–13.11) months. A total of 15.3% (79/513) of the mothers never breast-fed. In summary, 20.9% (93/444) of the mothers were breast-feeding at the 12-month interview; and 15/486 mothers were breast-feeding at the 24-month interview (Table 1).

During the first 4 days, 61.7% (263/426) of babies received supplemental feedings. Of these, at the 2-week interview, 101/263 were fully and 35/263 were partially breast-feeding. At the 6-week interview, 114/263 were fully and 32/263 were partially breast-feeding.

For supplementary feedings in the first days of life, 81.7% (215/263) of the babies received different types of formula (125/215 = 58.1%), some glucose-fat-amino acids solution (70/215 = 32.6%), tea (4/215 = 1.9%), or combinations thereof (15/

TABLE 2. Background data on the cohort

Age distribution	<26 y	13.9%
n = 555	26–35 y	67.0%
	>35 y	19.1%
Living situation	Lives alone	2.7%
n = 548	With partner	96.2%
	Other	0.9%
Highest education	Elementary school	5.2%
n = 541	Apprenticeship	31.2%
	High school	12.8%
	University	50.8%
Parity	First pregnancy	49.2%
n = 555	Second pregnancy	37.3%
	Third pregnancy	9.7%
	>3 pregnancies	3.8%
Mode of delivery	Vaginal delivery	59.6%
n = 555	Primary caesarean	17.8%
	Vacuum extraction	11.5%
	Secondary caesarean	10.9%
Gestational age at birth	34–36 wk	4.3%
n = 555	37–40 wk	80.4%
	41–42 wk	15.3%
Country of birth	Austria	80.4%
n = 539	Germany	8.8%
	Turkey	1.4%
	Bosnia	0.9%
	Czech Republic,	3 × 0.7%
	Ukraine, Hungary	
	1/country*	3.5%
Smoking during pregnancy	No	89.5%
n = 545	Yes	10.5%
Birth weight	Median 3320 g (interquartile range 3070–3630)	
Early supplemental feedings	No	38.3%
n = 426	Yes	61.7%
Time to first latch on	After 1 h+	69.5%
n = 482	After 2 h	12.7%
	Within 6 h	17.8%

For current living situation, 548 mothers responded and 7 did not. For highest education level, 541 mothers responded and 14 did not. For country of birth, 539 mothers responded. Smoking during pregnancy was self-reported by 545 mothers.

\*One mother each (total 19) named the following as country of birth: Brazil, Chile, England, India, Iran, Ireland, Italy, Croatia, Latvia, Lithuania, Mexico, The Netherlands, Poland, Romania, Russia, Serbia, Slovakia, Trinidad, and the United States.

TABLE 3. Numbers of breast-fed children and percentages in the first days after birth and at the interview times 2 and 6 weeks, 3, 6, 12, 18, and 24 months of life

	First days		2 wk		6 wk		3 mo		6 mo		12 mo		18 mo		24 mo	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Total	421		340		445		478		533		500		489		474	
Fully	300	71.2	232	68.2%	272	61.1%	266	55.6%	50	9.4%	3	0.6%	0	0.0%	0	0.0%
Partially	50	11.9	41	12.1%	52	11.7%	49	10.3%	211	39.6%	84	16.8%	38	7.8%	15	3.2%
Weaned	71	16.9	67	19.7%	121	27.2%	163	34.1%	272	51.0%	413	82.6%	451	92.2%	459	96.8%

Fully = fully breastfed; n = number of mothers available for the interview; Partially = partially breastfed.

215 = 7%). No baby received solely glucose solution as supplemental feeding.

In logistic regression analyses, risk factors for early weaning were early supplemental feedings, smoking during pregnancy, perceived milk insufficiency, low breast-feeding self-efficacy, lower maternal age, and lower education level of the mother (Table 4).

Mode of birth was not identified as a risk factor, neither was delayed time of first latch on. Most mothers, that is, 62.2% (335/539) of the mothers, however, reported the first latch-on within the first hour after birth, and 89.4% of the mothers reported it within the first 6 hours after birth.

## DISCUSSION

The breast-feeding target of roughly 6 months is far from being met in most industrialized regions (8–13), even though it is known that an adequate breast-feeding duration has an important impact on short- and long-term morbidity both for mother and child (3,5). This study evaluated aspects of breast-feeding in a cohort of 555 mother-baby dyads, to evaluate factors influencing weaning in our region.

In our cohort, the total median breast-feeding duration was 6.93 months, and at 6 months, only 9.4% of the mothers were fully breast-feeding. Proportions are similar to the ones reported in earlier studies (9–14), indicating that breast-feeding promotion efforts have not been effective in rising breast-feeding proportions so far. Breast-feeding duration is related to social background. Also, in our cohort, low maternal age and low educational level had a negative association with breast-feeding duration. Perceived milk-insufficiency, low breast-feeding self-efficacy, and early supplementation showed the most important association with early weaning in our cohort. The results highlight the need for more awareness toward hospital practice and breast-feeding promotion because not much has changed concerning breast-feeding rates and duration during the last 2 decades. One limitation of our study is a return rate per interview of ~80% because not all mothers were available at each interview.

### Perceived Milk Insufficiency

In our cohort, perceived milk insufficiency showed an odds ratio (OR) of 7.35 (95% CI 3.59–15.07), thus having the highest association with early weaning. Perceived milk insufficiency is the belief held by the breast-feeding mother that the amount or quality of her milk is insufficient to meet her baby's needs (15). It was a relevant reason for early involuntary weaning in other studies and cohorts (9,13). Worldwide, both in low- and high-income countries, it is the most prominent reason given for earlier-than-recommended weaning (16), indicating that the underlying mechanisms are psychosocial and cultural. The incidence of the true reduction in milk production is low, provided that breast-feeding management in the first days of life is adequate (2). Information on the physiology of breast-feeding, preferably during pregnancy, and family and

medical support in the phase of establishing breast-feeding are essential to warrant a successful breast-feeding relationship (2,5).

The burning question is why mothers come to the conclusion that their milk amount is insufficient. In our cohort, mothers interpreted their baby's behavior in this direction. Some quotes are as follows: "I have the feeling my baby is always hungry or never satisfied"; "my baby is restless"; "my baby is impatient." These observations agree with other studies, in which restlessness or crying after a feeding or rejection of the breast produces the feeling of milk insufficiency in the mother (16,17). In addition, misinterpreting baby's crying as hunger prompts supplemental feedings. This in turn can indeed cause reduced milk production, because supplemental feedings lead to less breast tissue stimulation by the sucking baby. In summary, supplemental feedings can change a perceived milk insufficiency into a real one (16–19). In 1991, Hill and Aldag (20) with their "Insufficient Milk Supply Syndrome" provided a model on which to elucidate factors prompting perceived milk insufficiency, for example, psychological setting of the mother, her breast-feeding knowledge, her health status, birth weight of the baby, support given by the father, or rejection by the mother-in-law.

In 1997, Obermeyer and Castle (19) summarized perceived milk insufficiency as a result of culturally determined behavior, in which the degree of acceptance and significance of motherhood and nutrition in the society led to insecurity and self-doubt in young mothers. Thus, they already demonstrated the importance of self-efficacy.

### Breast-feeding Self-efficacy

Although not specifically asked for in the interviews, the aspect of low breast-feeding self-efficacy shows an OR of 3.42 (95% CI 1.48–7.94,  $P < 0.01$ ). It is worthwhile to consider it because it influences weaning behavior in a relevant manner in our region. In 1999, Dennis (21) developed the concept of breast-feeding self-efficacy based on Bandura's self-efficacy concept (22). Breast-feeding self-efficacy is defined as the self-confidence of a mother in her ability to adequately feed her baby (23). In general, self-efficacy is the faith of an individual in the ability to act in a way that gives control over life events. It is the basis of all human action. If individuals are not convinced that their actions will lead to satisfactory results, they lack motivation to act at all (22). Translated to the breast-feeding situation, a mother who is confident that breast-feeding is the best and sufficient form of nutrition for her baby and that she is capable of satiating her baby, is more likely to adopt a healthy breast-feeding behavior. She will more likely opt to breastfeed, invest more time and effort in establishing a good breast-feeding relationship with her baby, cope with problems more successfully, and be more likely to view difficulties as a positive challenge (21). To scientifically evaluate the impact of self-efficacy on breast-feeding, Dennis et al (21) in 1999 developed a

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AQ14 TABLE 4. Association of risk predictors with breast-feeding duration &lt;6 months

Variables	Univariate			Multivariate			P
	OR	95% CI		OR	95% CI		
Birth weight	0.99	0.99	1.00				
<b>Early supplemental feedings</b>	<b>2.65</b>	<b>1.68</b>	<b>4.17</b>	<b>2.87</b>	<b>1.65</b>	<b>4.98</b>	***
<b>Smoking during pregnancy</b>	<b>6.83</b>	<b>2.95</b>	<b>15.80</b>	<b>3.19</b>	<b>1.16</b>	<b>8.78</b>	*
<b>Maternal age</b>							
>35 y <sup>†</sup>							
< 25 y	<b>4.14</b>	<b>2.06</b>	<b>8.35</b>	<b>3.89</b>	<b>1.45</b>	<b>10.46</b>	**
25–35 y	1.41	0.84	2.34				
<b>Highest maternal education</b>							
Academics <sup>†</sup>							
<b>Primary school</b>	<b>6.48</b>	<b>3.37</b>	<b>12.46</b>	<b>7.30</b>	<b>2.93</b>	<b>18.20</b>	***
<b>Higher school</b>	<b>2.77</b>	<b>1.48</b>	<b>5.20</b>	<b>2.94</b>	<b>1.23</b>	<b>7.07</b>	*
Mode of delivery	1.04	0.69	1.57				
Time to first latch on							
After 1 h <sup>†</sup>							
After 2 h	1.08	0.60	1.96				
Within 6 h	1.34	0.80	2.23				
<b>Weaning reasons</b>							
Not specified <sup>†</sup>							
<b>Perceived milk insufficiency</b>	<b>8.03</b>	<b>4.50</b>	<b>14.35</b>	<b>7.35</b>	<b>3.59</b>	<b>15.07</b>	***
<b>Low breast-feeding self-efficacy</b>	<b>2.71</b>	<b>1.37</b>	<b>5.37</b>	<b>3.42</b>	<b>1.48</b>	<b>7.94</b>	**
Other reasons	1.28	0.71	2.31				
Country of birth							
Austria							
Germany	0.65	0.32	1.31				
Turkey	1.79	0.30	10.81				
Other	0.79	0.42	1.49				
Parity							
First pregnancy							
Second pregnancy	1.64	0.53	5.04				
Third pregnancy	1.27	0.41	3.95				
>3 Pregnancies	0.98	0.27	3.60				

AQ15 Summary of univariate and multivariate logistic regression analysis for variables predicting early weaning; for assessment of early weaning risk factors, mothers were divided into 2 breast-feeding duration groups (<6 and ≥6 months). The latter was used as the outcome in the logistic regression models. Factors entered in the models were birth weight, early supplemental feedings, smoking during pregnancy, maternal age, the highest maternal education level, mode of delivery (vaginal birth vs Caesarean section), time-to-first latch-on, weaning reasons, country of birth, and parity. Results with  $P < 0.05$  were considered statistically significant. Factors not significant in the univariate analysis do not appear in the multivariate analysis. For association of risk predictors with breast-feeding duration <4 months, see supplemental Table 1, <http://links.lww.com/MPG/A493>. OR = odds ratio; CI = confidence interval.

<sup>†</sup> Reference category in case of >2 categories.

\*  $P < 0.05$ .

\*\*  $P < 0.01$ .

\*\*\*  $P < 0.001$  (multivariate analysis).

psychometric test, the “Breastfeeding Self-Efficacy Scale” (BSES). The correlation between breast-feeding self-efficacy and breast-feeding duration was established in various studies worldwide (21–25). Especially with regard to perceived milk insufficiency, individual breast-feeding self-efficacy has a relevant impact (23).

Translated to breast-feeding, Bandura’s model could mean the following: the health staff could encourage mothers to begin breast-feeding soon after the birth of their baby to start acquiring positive experiences; give breast-feeding mothers good role models, for example, encourage contact with other breast-feeding mothers or breast-feeding groups; involve significant partners (eg, life partner, family members, close friends) and medical personnel of the mothers for emotional and professional support; understand and, if necessary, address the individual physiological and affective state of mothers (22,21). Thus, in contrast to other sociodemographic high-risk factors for short breast-feeding duration, breast-

feeding self-efficacy is a factor that can be positively influenced, provided that awareness is good (21). Concretely, mothers with low breast-feeding self-efficacy and thus a high risk of early involuntary weaning can be identified, for example, through the BSES, and given specific advice to improve breast-feeding self-efficacy, instead of receiving only factual information on the advantages of breast-feeding. For our region, this approach could be a valuable tool for improving breast-feeding rates.

### Supplemental Feedings in the First Days of Life

In our cohort, the rate of babies receiving early supplementation with 62% is alarmingly high, considering all babies in the cohort were healthy and just 4.3% born with a gestational age between 34 and 36 weeks (Table 2). Guidelines reserve early supplementation to a medical indication (1,2,7,26,27). Thus,

hospital practice and especially breast-feeding—promoting practices need to be evaluated and changed in our region.

Human milk is the optimal and natural nutrition for babies. A baby's metabolism is adapted to the reduced milk amount until milk supply is sufficient (28). Labor causes secretion of catecholamines and thus an energy-sparing metabolic state (catabolic state), in which glycogenolysis and lipolysis are activated (28) and stabilize blood glucose concentrations (27,29–31). In addition to glucose and lactate, the newborn brain can metabolize ketone bodies well and uses them as alternative substrates (30,31). Moreover, energy expenditure in the first days of life is markedly reduced (30,31). The (physiological) weight loss of 5% to 7% in healthy term newborns is a postpartum reduction of 90% of the extracellular space and no dehydration (31). Thus, supplemental feeding is not recommended and not necessary in healthy term newborns in the first 72 hours of life (1,2,7,27). Supplementation should be given only for medical reasons (26); also because early supplementation is significantly associated with shorter breast-feeding duration (9,32).

## CONCLUSIONS

Sociodemographic variables and factors directly related to breast-feeding practices play an important role on breast-feeding duration/weaning in our region. Information on breast-feeding has markedly improved in the last decades, but factors such as perceived milk insufficiency, low breast-feeding self-efficacy, early supplemental feedings, lower maternal age, and lower educational level of the mother exert a strong influence on the time of weaning and have obviously escaped the necessary attention so far because breast-feeding rates have hardly changed. The recommended breast-feeding duration of 6 months was by far not reached in the cohort. The reasons are multifactorial. To be able to give adequate support to mothers—and have an impact on short- and long-term morbidity following early involuntary weaning, however,—it is essential to understand the factors that influence mother's and babies' decisions to wean and to properly address influencing factors.

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