Breastfeeding patterns in exclusively breastfed infants: a longitudinal prospective study in Uppsala, Sweden

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Exclusive breastfeeding was studied among 506 infants in Uppsala, Sweden, based on daily recordings during the first 6 mo. The mothers had previously breastfed at least one infant for at least 4 mo. Most of the mothers considered that they breastfed on demand. Wide variations in breastfeeding frequency and suckling duration were found both between different infants and in the individual infant over time. At 2 wk, the mean frequency of daytime feeds (based on one 13-d record) between different infants ranged from 2.9 to 10.8 and night-time feeds from 1.0 to 5.1. The daytime suckling duration (based on one 24-h record) ranged from 20 min to 4h 35 min and night-time duration from 0 to 2h 8 min. At any given age, a maximum of only 2% of the infants were not breastfed during the night. At 4 mo, 95% of the infants were breastfeeding and 40% were exclusively breastfed at this age. Longer breastfeeding duration and longer duration of exclusive breastfeeding were both associated with higher frequency of breastfeeds, longer breastfeeding of the previous child and higher education. No gender differences were found. Maternal smoking was associated with shorter duration of exclusive breastfeeding, and pacifier use was associated with shorter duration of both exclusive breastfeeding and total breastfeeding. This study confirms that every mother–infant pair needs to be understood as a unique dyad throughout lactation. These data demonstrate a wide range of patterns among women who are exclusively breastfeeding and indicate that it would be inappropriate to put pressure on individual families to adopt preconceived patterns of infant feeding.

Breastfeeding patterns and behaviour depend on a complex interplay between the mother and the infant and a number of influencing factors. Many studies have shown that the frequency and duration of feeds influence the milk output and milk fat. The frequency of feeds is in turn influenced by the infant’s demand and the mother’s ability to provide milk (1–6). The frequency of feeds also has an important impact on the duration of the lactational amenorrhoea (7). The total duration of breastfeeding is correlated with many factors, such as breastfeeding support, the mother’s age, education, working conditions, social class, economic status, smoking, the infant’s use of a pacifier, and co-sleeping (8–11).

The positive effects of breastfeeding increase with increased exclusivity of breastfeeding during the first half year of life and with increased total breastfeeding duration. WHO therefore recommends exclusive breastfeeding during the first 6 mo of life, followed by continued breastfeeding complemented by appropriate and adequate foods, for up to 2 y or beyond (12). The recommendation about continued breastfeeding is not only meant for low-income countries but also for industrialized countries, where sustained breastfeeding beyond 6 mo has been linked to improved health (13) and development (14).

In 1991, a consensus was reached on new, more stringent, breastfeeding definitions, in order to categorize feeding patterns (15). The definition “exclusive breastfeeding” comprises infants who receive breast milk only, but allows drops of vitamins, minerals, and/or medicines in addition. In studies prior to 1991, as well as in several subsequent studies, less stringent criteria for exclusive breastfeeding were used. For instance, infants considered “exclusively breastfed” could have received ritual foods, water, formula feeds and semi-solids (1, 16–18). Furthermore, there have been few studies with daily recordings, following the day-to-day variation in exclusively breastfed infants over a long period (7). Thus there is little data on the daily variations in breastfeeding patterns. Such information is not only essential for individualized counseling in breastfeeding, but also gives insights into the mechanisms of breastfeeding.

The aims of this study were to elucidate the variations in three components of the breastfeeding pattern, i.e. the

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frequency of feeds, suckling duration and longest interval between two consecutive feeds in exclusively breastfed infants, using strict WHO criteria for exclusive breastfeeding (15). We also analysed factors influencing the duration of exclusive breastfeeding and the total duration of breastfeeding.

The study was part of the comprehensive collaborative WHO project “A multicentre, longitudinal study of the duration of lactational amenorrhoea in relation to breastfeeding practices” (19). The project was carried out between 1989 and 1994 in seven countries, Australia, Chile, China, Guatemala, India, Nigeria and Sweden within the frame of WHO’s Special Programme of Research Development and Research Training in Human Reproduction. The Swedish part of the project was organized by the Unit for International Child Health, Department of Pediatrics, Uppsala University, Uppsala.

Study population and methods

The educational level in Sweden is generally high and practically all parents have 11 y of formal education. Maternity and child health services cover all mothers and children up to the age of 7 y and the services are free. The total fertility rate was 2.1 in 1991. Almost all deliveries in Sweden take place in hospital; home deliveries are very unusual. After delivery, all fathers get 10 d paid leave. The parental leave, which could be shared by the parents, was 1.5 y (almost fully paid), during the study period, and fathers were taking an increasing part of it, 4% in 1990 and 11% in 1994 (20).

The present descriptive study had a longitudinal prospective design. The mother–infant pairs were followed up from the first week after delivery until the mother’s second menstruation post-partum or until a new pregnancy. The study took place in the city of Uppsala and the surrounding area within a radius of 20 km from the city centre. All mother–infant pairs included in the study were recruited from the University Hospital, where all deliveries in the county take place. Between May 1989 and December 1992, 15,189 infants were born (Fig. 1). During this period the Baby Friendly Hospital Initiative was launched in Sweden (21) and the maternity hospital in Uppsala were declared Baby Friendly in 1994. The maternity wards were visited almost every weekday (a total of 758 d) to recruit the mother–infant pairs. The inclusion criteria are given in Fig. 1. The 1,164 mothers who fulfilled all criteria were invited to participate in the study and 506 mothers agreed to take part (Fig. 1). The main reason for non-participation was the perceived high workload which the study might entail.

The mean age of the mothers in the study years (± standard deviation) was 30.7 ± 3.7 y. Of the 506 mothers, 344 had one child prior to the index child, 140 had two previous children, and 22 had three children. The mean number of years of formal education of the mothers was 14.2 ± 2.9 y; 91.5% had at least 11 y and all mothers had at least 9 y. Seventy-one percent were married and 29% lived in a common-law marriage; none was single. The fathers had a mean age of 33.0 ± 5.0 y. The mean educational level of the fathers was 14.9 ± 3.8 y; 90.5% had at least 11 y of formal education, and all but six had a minimum of 9 y.

The study comprised 270 male and 236 female infants. The average birthweight of the girls was 3.7 ± 0.4 kg and length 50.9 ± 1.8 cm, and those of the boys, 3.8 ± 0.4 kg and 51.8 ± 1.8 cm, respectively. Most of the infants (94.5%) were put to the breast within 1 h after delivery (range 0–18 h). The mean duration of participation in the study was 8.6 ± 3.4 mo.

Data were obtained from two charts completed by the mother and from fortnightly interviews by a research assistant. On one chart the mothers made daily records for 13 d of the number of suckling episodes, the number of episodes of breast milk expression, the number and category of supplementary feeds (including expressed breast milk and water) and any vitamins/minerals given. The second chart, which the mother completed every 14th day, consisted of a 24-h detailed record of the timing of every suckling episode and the point in time when other food was given.

The first 24-h record with time taking was made in the infants’ third week of life (2 but not yet 3 wk of age). Subsequent time taking was carried out fortnightly after the first 24-h detailed record. Thus each follow-up period was 14 d long. Every fortnight, structured interviews were conducted and anthropometric measurements were made by a research assistant in the home. The research assistant checked the record charts and recorded data for the previous 2 wk.

A total of 106 mothers discontinued participation for various reasons during the first 6 mo (Table 1). Occasionally mothers did not make records every day in a follow-up period. Missing data in the daily records amounted to 0.7%, and those in the 24-h detailed record to 4%.

The proportion of missing data for duration of night feeds in infants sleeping in their own bed varied from 0% to 1.2% in different 14-d periods. For infants with unrestricted access at night (co-sleeping), missing data varied between 7% and 37% in different 14-d periods. Between 8% and 14% of the exclusively breastfed infants co-slept frequently or daily with their mothers in each 14-d period.

Data analysis

Data were analysed longitudinally and cross-sectionally using the computer programme Quest (22). Cross-sectional analyses are based on either the 13-d recordings or on the 24-h detailed records. In each 14-d period (i.e. one follow-up period), approximately 10–15% of
the exclusively breastfed infants were given expressed breast milk. They were excluded from the analyses of the breastfeeding patterns during that follow-up period (unless otherwise stated), since the patterns can be affected when anything but suckled breast milk is given. The classification of the infants as exclusively breastfed or not exclusively breastfed was based on their feeding history after admission to the study (at 3–7 d postpartum). Any supplements given to the infants before inclusion in the study were disregarded in the classification. Twenty-nine percent of the 430 infants, exclusively breastfed during the first 14-d period, were given expressed breast milk. They were excluded from the analyses of the breastfeeding patterns during that follow-up period (unless otherwise stated), since the patterns can be affected when anything but suckled breast milk is given.
supplements (24% water and 5% formula) before inclusion in the study. To analyse the normality of the distribution of the breastfeeding variables, Lilliefors’, Shapiro-Wilk’s, and Kolmogoroff-Smirnoff’s tests were used. The Kaplan-Meier life-table method was used to analyse breastfeeding duration. Day-to-day variations in breastfeeding patterns were analysed by visual assessment of recorded data. The association between breastfeeding frequency and breastfeeding duration was analysed by linear regression analysis. This method was also used to study the correlation between breastfeeding duration and socioeconomic factors. To analyse differences between groups, the two-sample t-test, χ²-square, and Fisher’s exact test were used. A p-value of less than 0.05 was considered statistically significant.

Definitions used in the study

• “one breastfeeding episode”. Duration of suckling 2 min or longer and separated from previous breastfeed by at least 30 min. Suckling for less than 2 min was not recorded.
• “expression of breast milk”. Duration of expression 2 min or longer and separated from a breastfeed by at least 30 min. Expression for less than 2 min was not recorded.
• “expressed breast milk (EBM)”. Mother’s own breast milk given to the infant by other means than suckling (i.e. with spoon, bottle, cup, or other).
• “taste”. ≤10 ml of any liquid or food. “Meal”. >10 ml of any liquid or food
• “daytime”. 06.00–21.59 h. “Night-time”. 22.00–05.59 h.
• “feeding on demand”. The mother feeds her baby whenever it cries or indicates by some other means that it is hungry.
• “exclusive breastfeeding” (15). The infant receives breast milk (including expressed milk) and is allowed to receive drops and syrups (vitamins, minerals, medicines). The infant may not receive anything else.

Results
A longitudinal analysis showed that 85% of the infants (including those given expressed breast milk) were exclusively breastfed for 2 wk, 68% for 2 mo, 40% for 4 mo and 2% for 6 mo.

Breastfeeding patterns
Frequency of feeds. The number of feeds in exclusively breastfed infants showed an almost normal distribution at all ages. Ninety-five percent of the infants were breastfed on demand. The median frequencies of daytime feeds remained almost constant at slightly below 6 during the first 26 wk (Fig. 2). The median number of night feeds showed a declining trend from 2.2 feeds at 2 wk to 1.3 at 12 wk, after which it increased up to 1.8 at 20 wk. The breastfeeding frequency had a wide range at every age. For instance, the frequency of daytime feeds ranged from 2.9 to 10.8 at 2 wk of age and from 3.2 to 8.5 at 20 wk.

The frequency of night-time feeds ranged from 1.0 to 5.1 at 2 wk and from 0 to 4.0 at 20 wk. At 2 wk, 85% of the infants were breastfed on average 1.0–2.9 times per night. At 4 wk 81%, and at 12 and at 20 wk 73% were breastfed 1.0–2.9 times. At 2 wk, 15% of the infants were breastfed ≥3 times per night, at 4 wk 7%, at 12 wk 1% and at 20 wk 8%. In all age groups a maximum of only 2% were not breastfed during the night.

Table 1. Number of infants who dropped out of the study since previous age, reasons for discontinuation and infants still exclusively breastfed at each age.

<table>
<thead>
<tr>
<th>Age (wk)</th>
<th>No. of infants taking part in the study</th>
<th>No. of drop-outs since previous age and reasons for discontinuation</th>
<th>Exclusively breastfed infants</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Suckled breast milk only</td>
</tr>
<tr>
<td>2</td>
<td>506</td>
<td>0</td>
<td>389</td>
</tr>
<tr>
<td>4</td>
<td>499</td>
<td>6 mother’s wish 1 family reason</td>
<td>353</td>
</tr>
<tr>
<td>8</td>
<td>493</td>
<td>3 mother’s wish 1 hormonal contraception 1 family reason</td>
<td>287</td>
</tr>
<tr>
<td>12</td>
<td>486</td>
<td>4 hormonal contraception 2 mother’s wish 1 moved</td>
<td>243</td>
</tr>
<tr>
<td>16</td>
<td>472</td>
<td>12 second menstruation 1 hormonal contraception 1 moved</td>
<td>167</td>
</tr>
<tr>
<td>20</td>
<td>454</td>
<td>16 second menstruation 2 mother’s wish 1 moved</td>
<td>65</td>
</tr>
<tr>
<td>24</td>
<td>423</td>
<td>28 second menstruation 2 hormonal contraception 1 mother’s wish</td>
<td>18</td>
</tr>
<tr>
<td>26</td>
<td>400</td>
<td>21 second menstruation 1 hormonal contraception 1 pregnant</td>
<td>7</td>
</tr>
</tbody>
</table>
The frequency of feeds during a night was analysed in detail for all exclusively breastfed infants at 4 mo of age, including those given EBM (n = 189); data were missing for four infants. This analysis showed that 159 were breastfed during the night (22.00–5.59 h). Forty-eight percent of these infants were breastfed once, 37% twice, 11% three times and 3% four times. Only one infant (1%) was breastfed five times. The timing of the night feedings is shown in Fig. 3.

An analysis of the day-to-day variation in suckling frequency was carried out by visual assessment of the records of each individual breastfeeding pattern for 40 consecutively selected infants, exclusively breastfed throughout the first 4.5 mo. This analysis revealed three distinct patterns. Half of the group showed a stable pattern in the number of breastfeeds during a 24-h period. In about 25% of the infants the number of breastfeeds was gradually reduced during the early months and in about 25% of the infants there was an initial declining trend in the breastfeeding frequency but an increase again at around 3–4 mo.

The breastfeeding frequencies in the most extreme cases, among the exclusively breastfed infants at 2 wk, were analysed longitudinally to find out whether the frequency was consistent over a longer period. The first group (n = 12, corresponding to the 3rd percentile) was breastfed ≤ 5.5 times per 24 h and had a mean suckling duration of 1 h 50 min per 24 h at 2 wk. The second group (n = 12, corresponding to the 97th percentile) was breastfed > 11 times per 24 h and had a mean suckling duration of 2 h 47 min at 2 wk. In the first group, eight infants continued at this low feeding frequency level for 4½–6 mo. The remaining four fluctuated between five and eight feeds. In the second group, three infants continued at the level of > 11 times per 24 h for 5–6 mo. In the remaining nine the number of feeds gradually decreased, but they usually had at least eight feeds per 24 h.

The 12 infants with a breastfeeding frequency of ≤ 5.5 times per 24 h were exclusively breastfed for a median of 1.8 mo, compared with 4.0 mo in the 12 infants with a feeding frequency of > 11 times per 24 h. All 24 infants, including those in the low frequency group, received little or no supplements during the first 4 mo. The supplements given were occasional and consisted mainly of water or formula. The median
The breastfeeding duration figures verified a 100% breastfeeding rate at 2 wk, 85% at 6 mo and 21% at 12 mo and a median breastfeeding duration of 8.7 mo (life table analysis, \( n = 506; \) Fig. 6). The breastfeeding duration was known for 393 infants (78%).

The associations between total duration of breastfeeding and breastfeeding frequency at 2 and at 12 wk, and also between total duration of breastfeeding and background factors were studied by linear regression analysis. The regression coefficient \( b \) for breastfeeding duration in the two groups were 8.6 mo and 11.8 mo, respectively.

The infant with the consistently highest frequency of feeds (Fig. 4a) was exclusively breastfed on demand for 22 wk and was thereafter given semi-solids in addition. He usually co-slept with his mother. The infant with the consistently lowest frequency of feeds (Fig. 4b) was exclusively breastfed for 16 wk, mostly not on demand. Thereafter she was given semi-solids in addition (only as tastes up to 26 wk).

Suckling duration. The distribution of the total suckling duration in these exclusively breastfed infants was slightly positively skewed at each age. The total suckling duration decreased slowly with increasing age of the infant, both during the daytime and nighttime, as well as over a 24-h period (Fig. 5). The median suckling duration during the daytime was 1 h 32 min at 2 wk (range 20 min to 4 h 35 min) and 1 h at 20 wk (range 25 min to 3 h 16 min). During the night-time the median suckling duration was 32 min at 2 wk (range 0 to 2 h 8 min) and 18 min at 20 wk (range 0 to 1 h 33 min). The suckling duration per 24 h can be seen in detail in Table 2. The suckling duration per feed decreased slowly over time, during the daytime from 17 min at 2 wk to 10 min at 20 wk, and during the night-time from 16 min at 2 wk to 10 min at 20 wk. The variation in suckling duration per feed was wide, especially for night feeds, which, at 2 wk for example, ranged from 0 to 1 h 38 min and at 20 wk from 0 to 1 h 1 min.

Interval between feeds. The distribution of the longest interval between two consecutive feeds, or expression of breast milk, in infants was positively skewed at each age. This longest interval increased from 4½ h at the age of 2 wk (range 2½–10 h) to 7 h at 12 wk, after which it started to decrease, and at 20 wk the interval was 6 h (range 3–11½ h).

Breastfeeding duration

One of the criteria for inclusion in the study was that the mother should have the intention to breastfeed for at least 6 mo. The breastfeeding duration figures verified a 100% breastfeeding rate at 2 wk, 85% at 6 mo and 21% at 12 mo and a median breastfeeding duration of 8.7 mo (life table analysis, \( n = 506; \) Fig. 6). The breastfeeding duration was known for 393 infants (78%).
Feeding frequency was 0.60 at 2 wk (p < 0.01) and 0.79 at 12 wk (p < 0.01). For duration of previous breastfeeding experience $b = 0.77$ ($p < 0.01$), for mother’s education $b = 0.35$ ($p < 0.01$) and for father’s education $b = 0.23$ ($p < 0.01$). Duration of labour, interval between delivery and start of first breastfeed, and number of children were not significantly associated with breastfeeding duration.

Pacifier use was associated with a shorter duration of exclusive breastfeeding and shorter total breastfeeding duration. Thirty-six percent of the infants who used a pacifier frequently during the first 6 mo were still exclusively breastfed at 4 mo, compared with 49% of non-users ($p = 0.03$). Exclusively breastfed infants using a pacifier frequently at 2 wk had a mean breastfeeding duration of 8.1 mo, compared with 9.7 mo in non-users ($p < 0.01$). Pacifier use will be discussed in more detail in a forthcoming paper.

### Gender differences

There were no statistically significant infant gender differences with respect to the variables tested (breastfeeding patterns, breastfeeding duration, duration of exclusive breastfeeding, social background of parents and mother’s previous breastfeeding experience).

### Smoking

The prevalence of daily smoking among the mothers in the different follow-up periods during the first 5 mo after delivery ($n = 506–454$) ranged from 6.3–7.7%. Of these daily smokers, 34% smoked ≤5 cigarettes/d, 42% smoked 6–10 cigarettes/d, and 24% smoked 11–15 cigarettes/d. A significant difference between daily smokers and non-smokers (including occasional smokers) was found in the duration of exclusive breastfeeding. Forty-nine percent of the infants of mothers who smoked daily were exclusively breastfed at 2 mo, compared with 70% of the infants of non-smokers ($p = 0.01$). At 4 mo the exclusive breastfeeding rates were 18% and 42% respectively ($p = 0.01$). No significant differences in breastfeeding patterns nor total breastfeeding duration were found between the two groups.

### Table 2

The total suckling duration per 24 h and the longest interval between two breastfeeds at different ages. Median, 25th and 75th percentiles, and range.

<table>
<thead>
<tr>
<th>Age (wk)</th>
<th>Median Total suckling duration per 24-h. (h:min)</th>
<th>25th–75th percentiles</th>
<th>Range</th>
<th>Median Longest interval between breastfeeds (h:min)</th>
<th>25th–75th percentiles</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>1: 42</td>
<td>1: 12–2: 12</td>
<td>0: 36–6: 45</td>
<td>6: 38</td>
<td>5: 07–8: 35</td>
<td>2: 36–12: 36</td>
</tr>
<tr>
<td>24</td>
<td>1: 20</td>
<td>1: 10–1: 36</td>
<td>0: 55–1: 57</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Discussion

The present study gave a unique opportunity to investigate the breastfeeding patterns of a sizeable sample of mother–infant pairs in-depth, in a prospective, detailed day-to-day manner over a long period. This is in contrast to most studies on patterns of breastfeeding for exclusively breastfed infants. Most of these have been cross-sectional in design and those with a longitudinal design have usually comprised only a few subjects and have not been based on daily recordings and the study periods have usually been shorter (1, 7, 23).

It is clear that the present study concerns a highly selected group with a high rate of exclusive breastfeeding and a declared intention to breastfeed for 6 mo, in a population known to have a high rate of breastfeeding. Undoubtedly the selection criteria of mother–infant pairs have had a bearing on the total duration of breastfeeding as well as the duration of exclusive breastfeeding.

Nevertheless, this study has provided information of value for the understanding of breastfeeding patterns of exclusively breastfed infants.
At every home visit, the interviewers estimated whether the information from the detailed 24-h record was likely to be accurate. Between 5.3% and 9.2% of the 24-h recordings (mostly regarding the duration of feeds) were deemed to be not accurately done. The most common reasons for inaccuracy were “mother sleepy” and "data estimated". The latter usually meant that the mother had given a guess instead of an exact timing of, for example the duration of one of the feeds during the 24 h. The mothers were trustworthy and the recordings were in agreement with the interviews. Based on the above reasoning the reliability of the records was thus considered good. If there were any biases in the recordings on frequency of feed, we do not know whether they were on the side of under- or over-reporting. A team leader and two supervisors checked the measurements made by the interviewers. The forms were evaluated weekly by the research assistants. Missing recordings were few.

The most important findings in the present study were the wide variations in breastfeeding patterns, both between individuals and in the same individual over time. From a study in the USA, Quandt (23) reported corresponding variations between infants regarding frequency of feeds, suckling duration per feed and per 24 h, and longest interval between feeds among exclusively breastfed infants at 4 \((n=68)\) and 8 \((n=48)\) wk. The intra-individual variations in breastfeeding frequencies over time were quite consistent in some infants, while others showed wider day-to-day variations. To the best of our knowledge, there have been no other reports on such individual variations. Our findings underline the importance of investigating feeding patterns of the individual infant rather than focusing on mean or median values for a larger group, as is done in many studies.

One to three night feeds were common, and it was unusual for infants to sleep through the entire night. The study design gave us a unique opportunity to look into the exact timing of the night feeds. The feeds were distributed throughout the night, with higher frequencies before midnight and after 04.00 h. We are uncertain whether night feeding is less common in the middle of the night or whether women are less able to recall those feeds. It is difficult to compare our results with those of other studies because of differences in the definition of night and in the study design, although our observations are in agreement with those of Elias (24) and Anders (25), who found that few infants slept through the night.

During the first 6 mo of life, the median frequency of feeds in exclusively breastfed infants in our study was stable at about eight feeds per 24 h. This is in conformity with the finding by Howie (7) that the mean suckling frequency was relatively constant during full, unsupplemented breastfeeding. In contrast, Butte et al. (17) and de Carvalho (1) noted a decline in feeding frequency during the first months. The median suckling duration in the present study showed a gradual decrease during the first 6 mo. Butte et al. (17) found the same decrease, while Howie (7) and de Carvalho (1) reported a relatively constant suckling duration. These varying results may very well be due to differences in study design and in the definitions used for exclusive breastfeeding. Such comparison may therefore not be valid.

Most of the mothers in the present study considered that they breastfed on demand. It was the mother’s own perception of “on-demand feeding” that decided whether she was classified as feeding on demand or not. Even if mothers stated that they breastfed on demand, they could have been influenced by advice from friends, family or health personnel based on earlier recommendations of scheduled feeding (26). An objective definition for “on-demand feeding” is difficult to obtain, as this concerns interaction between mother and infant. Differences in this interaction could explain the wide range in breastfeeding frequency seen among the infants fed on-demand in our study. Virtually all mothers who provided their infants with a pacifier also considered that they breastfed on demand.

Specific periods of increased feeding frequencies at certain ages, so called “appetite spurts” (or even called “growth spurts”), were not observed in our study. The concept of appetite spurts is used in breastfeeding literature for parents and health workers. This concept relates to specific periods when the infant wants to feed more frequently, and is said to occur at around 7–10 d, 6 wk, and 3 mo (27). The notion of appetite spurts was developed during a period when scheduled breastfeeding was recommended. In the present study, days with increased feeding frequencies were observed in individual infants, but they occurred at random ages. This is possibly due to the fact that almost all infants in the study were breastfed on demand and they could therefore immediately regulate breast milk production in relation to their needs.

Twenty-nine percent of the 430 infants, exclusively breastfed during the first 14-d period, were given supplements before inclusion in the study. Most of them (84%) had been given water at the maternity ward, mainly before the Baby Friendly Hospital Initiative was launched in 1992 in Sweden (21).

As in other studies, we found that a longer duration of exclusive breastfeeding and a longer total duration of breastfeeding were associated with a higher frequency of feeds, higher age and a higher educational level of the parents (9, 11, 23, 28, 29). We also found a strong correlation between previous breastfeeding experience and the duration of exclusive and total breastfeeding.

In the present study, smoking was associated with a shorter duration of exclusive breastfeeding, but in contrast with other studies (9, 28), not with a shorter total breastfeeding duration. The reason for this is difficult to assess, but it might be related to the selection of the mothers or the low prevalence of smoking in our study.
In contrast with a Norwegian study by Pande (30) and a Brazilian study by Victoria (11), no infant gender differences in breastfeeding patterns or breastfeeding duration were seen in the present study.

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