Influence of Breast-feeding on Weight Loss, Jaundice, and Waste Elimination in Neonates

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Key Words
breast-feeding; jaundice; stool; urination; weight loss

Background: The Baby-Friendly Hospital Initiative began promoting exclusive breast-feeding in 2001 in Taiwan; however, few studies have investigated its impact. This study evaluated the influence of breast-feeding on Taiwanese neonates with regard to the frequency of jaundice, body weight loss (BWL), and elimination of both urine and stool.

Methods: The medical records of 313 healthy mother-neonate pairs admitted at our hospital were reviewed retrospectively and divided into three groups: exclusively breast-feeding (n = 161), mixed (breast/formula) feeding (n = 80), and exclusively formula feeding (n = 72).

Results: Compared with the exclusively formula feeding group, in the exclusively breast-fed neonates, the average total serum bilirubin level at 3 days after birth (p < 0.001) and the rate of significant hyperbilirubinemia/C21 15 mg/dL (p < 0.05) were significantly higher; the average BWLs at 2 and 3 days after birth (p < 0.001, p < 0.001) and the rate of BWL/C21 10% (p < 0.05) were significantly higher; the average frequency of stool passage at 2 and 3 days after birth (p < 0.001, p < 0.001) and urination at 1, 2, and 3 days after birth (p < 0.001, p < 0.001, p < 0.001) were significantly less. The factors associated with a mother’s choice of infant feeding type include maternal age and delivery method.

Conclusion: Breast-feeding during the initial days of life has a significant influence on the degree of jaundice, amount of BWL, and the frequency of stool passage and urination.

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1. Introduction

To improve the nutritional status, growth, and overall health of children, the World Health Organization and the United Nations Children’s Fund promote a global strategy for infant and young child feeding, which include the Baby-Friendly Hospital Initiative and 10 steps for successful breast-feeding. The optimal breast-feeding for infants is early and exclusive during the first 6 months of life and continues for 2 years or longer. In Taiwan, the Department of Health began promoting a breast-feeding project in 1992. They have supported exclusive breast-feeding and the Baby-Friendly Hospital Initiative since 2001. A nationwide follow-up survey revealed that the prevalences of exclusive and partial breast-feeding at 1 month after delivery increased from 5.8% and 25% in 1989 to 5% and 35.9% in 1996 and to 22.3% and 48.4% in 2004, respectively.3

Despite the many advantages of breast-feeding, previous medical reports revealed that dehydration, poor body weight gain, and hyperbilirubinemia in breast-fed infants are more common. These problems were often preventable and generally did not result in long-term harm to the infants; however, in recent years, serious consequences, such as hyponatremic dehydration and kernicterus have been reported in exclusively breast-fed infants. The causes may be attributed to inappropriate breast-feeding and to early discharge practices.6,7,9 Currently, almost all hospitals in Taiwan promote exclusive breast-feeding, yet few studies have investigated the influence of this practice on Taiwanese neonates.

Since 2001, our hospital has been promoting the Baby-Friendly Hospital Initiative, which includes breast-feeding classes, 24-hour rooming-in, and exclusive breast-feeding. In our experience, many mothers have concerns about breast-feeding, including breast-milk insufficiency, decreased infant urination, poor body weight gain, and jaundice. This study evaluated the influence of breast-feeding in the first week of life on Taiwanese neonates with respect to jaundice development, body weight loss (BWL), and the frequency of stool passage and urination. The secondary goal was to identify any factor(s) associated with a mother’s choice of infant feeding type.

2. Methods

2.1 Study design

The medical records of healthy neonates in the initial days of life at the Buddhist Tzu Chi Dalin General Hospital from July to December of 2008 were reviewed retrospectively. Apgar score, birth body weight, gender, feeding type, BWL, total serum bilirubin (TSB) level, and the frequency of stool passage and urination were recorded. TSB level was determined by the microbilirubin method. Furthermore, the medical records of the women who gave birth to these healthy neonates were reviewed. The method of delivery (normal spontaneous delivery [NSD] or caesarean section [CS]), parity (primiparous or multiparous), maternal age, and presence of maternal disease(s) were recorded.

Our study population was divided into three groups: exclusively breast-feeding, mixed feeding (partial breast-feeding), and exclusively formula feeding. Exclusive breast-feeding was defined as feeding only breast milk. Mixed feeding (partial breast-feeding) was defined as feeding with breast milk and formula. Neonates with any indication of disease, such as hemolytic, tachypnea, infection, or heart murmur, as well as mothers with obstetric complications were excluded from the study.

After promoting exclusive breast-feeding, we identified very few cases of exclusive formula feeding. To enroll more cases into this group, we included the mother-neonate pairs choosing exclusive formula feeding during the initial period of promoting breast-feeding from January to December of 2001.

The study was performed with approval of the hospital’s institutional review board and conducted in accordance with the guiding principles of the Declaration of Helsinki.

2.2 Statistical analysis

The t test, one-way Analysis of variance test with Scheffé’s method, Kruskal-Wallis test, Mann-Whitney U test, and χ² test with posteriori comparison (simultaneous confidence intervals), and product-moment correlation were used for statistical analysis of the data. A p value less than 0.05 was considered statistically significant. All statistical analyses were performed using commercially available computer software programs (SPSS for Windows, version 17.0; SPSS Inc., Chicago, IL, USA).

3. Results

Three hundred thirteen healthy mother-neonate pairs were enrolled and divided into three groups: exclusively breast-feeding (n = 161), mixed (breast/formula) feeding (n = 80), and exclusively formula feeding (n = 72). The characteristics of the study subjects are listed in Table 1. There were significant differences among all three groups in the following variables: maternal age, delivery method, and Apgar score.

All neonates were routinely checked for TSB level at least once during hospitalization, most at 3–4 days after birth and received follow-up if jaundice was suspected. The peak TSB level of the exclusively breast-feeding group occurred 3–5 days after birth and was comparable with those of both the mixed feeding and exclusively formula feeding groups. The average TSB levels at 3 days (48–72 hours) and 4 days (72–96 hours) after birth were 11.4 ± 3.1 mg/dL (n = 146) and 13.2 ± 3.0 mg/dL (n = 30) in the exclusively breast-fed group; 10.0 ± 2.6 mg/dL (n = 67) and 10.8 ± 2.4 mg/dL (n = 24) in the mixed feeding group; and 8.7 ± 2.3 mg/dL (n = 52) and 9.8 ± 3.2 mg/dL (n = 22) in the formula-fed group, which were significantly different among these three groups (F = 19.356, p < 0.001; F = 9.825, p < 0.001) (figure not shown). Visible jaundice (TSB level >8 mg/dL) and hyperbilirubinemia (TSB level >15 mg/dL) occurred in 93.1% and 22.0% of the exclusively breast-fed infants, respectively. The rates dropped to 88.5% and 9.0% in the mixed feeding group and further declined to only 66.2% and 4.4% in the...
excluding formula-fed infants ($p < 0.001$, $p = 0.001$) (Table 2). Nine cases had a TSB level of more than 18 mg/dL, including eight exclusively breast-fed infants (the highest level was 20.1 mg/dL) and one mixed-fed infant (the level was 19.3 mg/dL) (data not shown). The rates of visible jaundice (TSB level ≥8 mg/dL) and hyperbilirubinemia (TSB level ≥15 mg/dL) in the exclusively breast-fed infants were statistically significant higher than the exclusively formula-fed infants ($p < 0.05$, $p < 0.05$) (Table 2).

The sample size ($n = 72$) of neonates beyond the third day of life for analysis of BWL, stool passage, and urination was relatively small for supporting a statistically valid assessment. Thus, we only further analyzed those data in the first 3 days after birth. The maximum average BWLs for both the exclusively breast-fed and the mixed-fed infants occurred 3 days after birth. The average BWLs of infants 2 and 3 days old were significantly different among these three groups ($p < 0.001$, $p < 0.001$; $n = 159$, 130 in the exclusively breast-feeding group; $n = 80$, 71 in the mixed

### Table 1  Comparison of basic characteristics for three different feeding type groups

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Exclusively breast (a)</th>
<th>Mixed (b)</th>
<th>Exclusively formula (c)</th>
<th>$p^*$</th>
<th>Posteriori comparison$^1$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample size ($N$)</td>
<td>161</td>
<td>80</td>
<td>72</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age of mother (yr)</td>
<td>28.6 ± 4.5</td>
<td>30.2 ± 4.6</td>
<td>26.9 ± 4.4</td>
<td>$&lt;0.001$</td>
<td>b &gt; a &gt; c</td>
</tr>
<tr>
<td>Premature (%)</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>0.913</td>
<td></td>
</tr>
<tr>
<td>Maternal HBsAg (+) (%)</td>
<td>11</td>
<td>13</td>
<td>11</td>
<td>0.903</td>
<td></td>
</tr>
<tr>
<td>Maternal anti-HBeAb (+) (%)</td>
<td>2</td>
<td>0</td>
<td>6</td>
<td>0.095</td>
<td></td>
</tr>
<tr>
<td>Maternal thalassemias (+) (%)</td>
<td>7</td>
<td>5</td>
<td>4</td>
<td>0.682</td>
<td></td>
</tr>
<tr>
<td>SGA (%)</td>
<td>4</td>
<td>11</td>
<td>4</td>
<td>0.08</td>
<td></td>
</tr>
<tr>
<td>LGA (%)</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>0.521</td>
<td></td>
</tr>
<tr>
<td>Parity (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primiparity</td>
<td>55</td>
<td>52</td>
<td>56</td>
<td>0.924</td>
<td></td>
</tr>
<tr>
<td>Neonatal gender (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boy</td>
<td>51</td>
<td>51</td>
<td>63</td>
<td>0.231</td>
<td></td>
</tr>
<tr>
<td>Delivery method (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NSD</td>
<td>82</td>
<td>65</td>
<td>68</td>
<td>0.006</td>
<td>a &gt; b</td>
</tr>
<tr>
<td>Apgar score (1 min)</td>
<td>8.9 ± 0.3</td>
<td>9 ± 0.2</td>
<td>8.3 ± 0.6</td>
<td>$&lt;0.001$</td>
<td>a &gt; c, b &gt; c</td>
</tr>
<tr>
<td>Apgar score (5 min)</td>
<td>9.9 ± 0.3</td>
<td>10 ± 0.2</td>
<td>9.3 ± 0.5</td>
<td>$&lt;0.001$</td>
<td>a &gt; c, b &gt; c</td>
</tr>
<tr>
<td>BBW (g)</td>
<td>3140.6 ± 326.95</td>
<td>3131.5 ± 393.5</td>
<td>3086.5 ± 356.7</td>
<td>0.548</td>
<td></td>
</tr>
</tbody>
</table>

* Statistics are significant at the 0.05 level. The $p$ values are for the comparison among all three groups calculated with one-way ANOVA test or Kruskal-Wallis test for continuous variables or $\chi^2$ test for categorical variables;

$^1$ Posteriori comparisons were performed by Scheffe’s test or Mann-Whitney U test or two-by-two $\chi^2$ test.

BBW = birth body weight; HBeAb = hepatitis B e antibody; HBsAg = hepatitis B surface antigen; LGA = large for gestational age; NSD = normal spontaneous delivery; SGA = small for gestational age.

### Table 2  Comparisons of BWL and TSB among three different feeding type groups

<table>
<thead>
<tr>
<th></th>
<th>Exclusively breast (a)</th>
<th>Mixed (b)</th>
<th>Exclusively formula (c)</th>
<th>$p^*$</th>
<th>Posteriori comparison$^1$</th>
</tr>
</thead>
<tbody>
<tr>
<td>N for valid TSB level</td>
<td>161</td>
<td>80</td>
<td>72</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TSB level ≥8 mg/dL (%)</td>
<td>93.1</td>
<td>88.5</td>
<td>66.2</td>
<td>$&lt;0.001$</td>
<td>a &gt; c, b &gt; c</td>
</tr>
<tr>
<td>TSB level ≥15 mg/dL (%)</td>
<td>22.0</td>
<td>9.0</td>
<td>4.4</td>
<td>0.001</td>
<td>a &gt; b, a &gt; c</td>
</tr>
<tr>
<td>N for valid BWL</td>
<td>161</td>
<td>80</td>
<td>71</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BWL ≥7% (%)</td>
<td>66.3</td>
<td>33.8</td>
<td>2.8</td>
<td>$&lt;0.001$</td>
<td>a &gt; b &gt; c</td>
</tr>
<tr>
<td>BWL ≥10% (%)</td>
<td>10.0</td>
<td>3.8</td>
<td>0.0</td>
<td>0.008</td>
<td>a &gt; c</td>
</tr>
</tbody>
</table>

* $\chi^2$ test of homogeneity of proportions is significant at $p < 0.05$;

$^1$ Posteriori comparisons by the simultaneous confidence interval.

BWL = body weight loss; TSB = total serum bilirubin.
feeding group; \( n = 71, 63 \) in the exclusively formula feeding group) (Figures 1A and 2A), in which the average BWLs of the exclusively breast-fed infants at 2 and 3 days of life were the highest. BWLs greater than 7% and 10% from birth weight of infants occurred in 66.3% and 10% of the exclusively breast-feeding group, in 33.8% and 3.8% of the mixed feeding group, and in 2.8% and 0% of the exclusively formula feeding group, respectively. The rates of BWLs greater than 7% and 10% from birth weight of infants in the exclusively breast-feeding group were significantly higher than in the exclusively formula feeding group (\( p < 0.05, p < 0.05 \)) (Table 2).

In multiple comparison analysis that compared with the exclusively formula-fed infants, the average frequency of stool passage for both the exclusively breast-fed infants and the mixed-fed infants at 2 and 3 days of life was significantly decreased (p values of all were less than 0.001; \( n = 159, 80 \) in the exclusively breast-feeding group; \( n = 80, 51 \) in the mixed feeding group; \( n = 71, 52 \) in the exclusively formula feeding group) (Figures 1B and 2B). The average frequency of urination for infants at 2 and 3 days of life was significantly different among these three groups (\( p < 0.001, p < 0.001 \); \( n = 159, 80 \) in the exclusively breast-feeding group; \( n = 80, 51 \) in the mixed feeding group; \( n = 71, 52 \) in the exclusively formula feeding group), with that of the exclusively breast-fed infants being the least. Additionally, by multiple comparison, the average frequency of urinations and 3 stools per day are expected.2 A study showed that the time to first stool passage of exclusively breast-fed infants was 3 stools per day at 3 days of age (Figure 1D). The frequency of urination and stool passage of exclusively breast-fed infants was 3–4 urinations and 4–5 stools per day at first day of age, 3–4 urinations and 3–4 stools per day at 2 days of age, 4–5 urinations and 4–5 stools per day at 3 days of age, and 6–12 urinations and 5–8 stools per day by 4–6 days of age (Figure 1B and C). Compared with the exclusively formula-fed infants, the average frequencies of both stool passage and urination for the exclusively breast-fed infants were fewer during the first 3 days of life and then increased gradually and surpassed that of the formula-fed infants by 6 days after birth (Figure 1B and C). Whether it is a natural process for the exclusively breast-fed infants merits further study because the frequency of both stool passage and urination for the formula-fed infants is not the standard against which to measure that for the exclusively breast-fed infants.

The American Academy of Pediatrics states that during the early weeks of infant life, the frequency of breast-feeding should be 8–12 times per day. The expected frequency of urination and stool passage for breast-fed infants 3–5 days old should be 3–5 urinations and 3–4 stools per day. By 5–7 days of age, 4–6 urinations and 3–6 stools per day are expected.2 A study showed that the time to first urination in breast-fed infants was earlier than in formula-fed infants (7.3 vs. 8.5 hours; \( p = 0.03 \)), but the time to first stool passage showed no significant difference between these two groups (7.6 vs. 7.9 hours).16 In our study, exclusively breast-fed infants were fed 8–9 times per day at first day of age, then 10–12 times per day by 2–6 days of age (Figure 1D). The frequency of urination and stool passage of exclusively breast-fed infants was 3–4 urinations and 4–5 stools per day at first day of age, 3–4 urinations and 3–4 stools per day at 2 days of age, 4–5 urinations and 4–5 stools per day at 3 days of age, and 6–12 urinations and 5–8 stools per day by 4–6 days of age (Figure 1B and C). Whether it is a natural course for the exclusively breast-fed infants merits further study because the frequency of both stool passage and urination for the formula-fed infants is not the standard against which to measure that for the exclusively breast-fed infants.

BWLs of less than 10% are physiologically acceptable for neonates. A study from the United States Centers for Disease Control reveals that breast-fed infants who grow more rapidly in their first 2 months and then taper off until 1 year of age are heavier and shorter than the National Center for Health Statistics/World Health Organization reference population.17 If infants have appropriate breast-feeding, there is no need to worry about their growth, including transient BWL. However, BWLs more than 7% from birth weight indicate possible breast-feeding problems and require urgent evaluation.2 Several reports indicated that critical hypernatremic dehydration may develop in exclusively breast-fed infants.8,15,18 Our study showed that the incidence of BWLs greater than 7% and 10% in the exclusively breast-fed infants was significantly higher than in the exclusively breast-fed infants (Table 2). Neither primiparity nor CS significantly increased the risk of excessive BWL (\( \geq 10\% \)) in the exclusively breast-fed neonates in our study (data not shown), although previous studies showed that both primiparity and CS were risk factors for excessive BWL.8,15 A thorough breast-feeding assessment, including daily weight evaluation and early follow-up, is essential to

4. Discussion

In our study, the prevalence of exclusive breast-feeding was higher than in the previous nationwide follow-up survey in Taiwan.5–9 Furthermore, the prevalences of both total (i.e., exclusive and partial breastfeeding) and exclusive breast-feeding from July to December 2008 in our study were 98% (241/246) and 65.4% (161/246), respectively, which was higher than the numbers observed in Baby-Friendly Hospitals in Taiwan in 2008 (95.7% and 48%).10 We consider that our hospital had been promoting the Baby-Friendly Hospital Initiative and adopting the 10 steps to successful breast-feeding effectively.

Previous studies revealed that physiological, psychological, and sociocultural factors, including maternal intention, maternal concern about breast milk insufficiency, maternal fatigue, breast problems, breast-feeding acceptance from her husband, and social support mainly influenced a mother’s decision to breast-feed.6,11–14 Some studies reported that the breast-feeding rate of primiparous mothers was higher.14,15 In our study, there were significant differences among all three groups with respect to maternal age, delivery method, and Apgar score (Table 1). Furthermore, compared with the exclusively formula feeding group, the exclusively breast-feeding group had an older average maternal age (28.6 ± 4.5 vs. 26.9 ± 4.4 years old; \( p = 0.034 \)), and higher Apgar scores at 1 minute (8.9 ± 0.3 vs. 8.3 ± 0.6; \( p < 0.001 \)) and 5 minutes (8.9 ± 0.3 vs. 9.3 ± 0.5; \( p < 0.001 \)). However, because 67 of 72 pairs in the exclusively formula feeding group were collected during a different period of promoting breast-feeding, from January to December 2001, the meaning of these differences needs further study. Compared with the mixed feeding group, the exclusively breast-feeding group had a younger average maternal age (28.6 ± 4.5 vs. 30.2 ± 4.6 years old; \( p = 0.033 \)) and a higher rate of NSD (82% vs. 65%; \( p < 0.05 \)) (Table 1). In the future, a qualified questionnaire may be necessary to explore the factors affecting a mother’s choice of infant feeding type.
Figure 1  (A–C) Comparison of BBW and the frequency of stool passage and urination among three different feeding type groups. (D) The frequency of breast-feeding in the exclusively breast-feeding group and the mixed-feeding group. 1st day = 1 day after birth (<24 hours after birth); 2nd day = 2 days after birth (24–48 hours after birth); 3rd day = 3 days after birth (48–72 hours after birth); 4th day = 4 days after birth (72–96 hours after birth); 5th day = 5 days after birth (96–120 hours after birth); 6th day = 6 days after birth (120–144 hours after birth). BBW = body weight loss.
prevent critical dehydration. We consider that this is particularly important for infants of primiparous mothers and those who delivered by the method of CS.

Breast-feeding-associated jaundice is classified into early breast-feeding jaundice and late breast milk jaundice. Early breast-feeding jaundice develops in the first week of life, whereas breast milk jaundice peaks at 10–21 days of life but may persist until 2–3 months of age. Breast-feeding jaundice was generally thought to be harmless; however, in the last 15 years, there have been reports of kernicterus in exclusively or even partially breast-fed infants. Inadequate breast-feeding, which leads to dehydration and/or starvation, coupled with early discharge practices, could increase this risk. Lactation counseling plays an important role in the success of breast-feeding. If an early discharge occurs, the American Academy of Pediatrics recommends all breast-fed infants have a follow-up appointment with a pediatrician by 3–5 days of age to assess body weight and the presence of jaundice. After an infant was discharged, we usually arranged an early follow-up visit 1–2 days later, in addition to giving a telephone visitation for breast-feeding counseling. Hyperbilirubinemia should be further evaluated if the hour-specific TSB level of the infant is above the 95th percentile in that population or rises rapidly to cross percentiles, and we cannot explain it by the history and physical examination findings. Significant hyperbilirubinemia should be based on the TSB level of the infant’s age in hours and defined as a hour-specific TSB level above the threshold of phototherapy. In our study, the average TSB levels in the exclusively breast-fed neonates 3 days old were significantly higher than that in the formula-fed neonates. Our study demonstrated a statistically significant positive correlation between hyperbilirubinemia and breast-feeding, which agrees with previous studies that suggested breast-feeding was associated with hyperbilirubinemia within the first 3 days of life. The incidence of hyperbilirubinemia (TSB level ≥15 mg/dL) was significantly higher in exclusively breast-fed infants (Table 2), and therefore it led to higher rate of readmission for phototherapy. The criterion of readmission for phototherapy for a well-term infant in our hospital is TSB level ≥15 mg/dL after 48 hours of age. The percentage of readmission was 22.4% (36/161) for the exclusively breast-fed group, including a case of TSB level 13.8 mg/dL at age 2 days (24–48 hours), 9% (7/80) for the
mixed-fed group, and 4.4% (3/72) for the formula-fed group in this study. If the criterion is TSB level ≥18 mg/dL in exclusively breast-fed infants, only 8 (5%) infants need admission for treatment, but it might increase to a level that is dangerous for the infants. The higher rate of admission for treatment in the exclusively breast-fed group merits further study to understand the influence. Furthermore, poor caloric intake and/or dehydration in inadequate breast-fed infants may lead to hyperbilirubinemia. However, there was no significant positive association between hyperbilirubinemia (TSB level ≥15 mg/dL) and excessive BWL (BWL ≥10%) in our study (data not shown).

Frequent breast-feeding (>10 times/24 hr) may decrease subsequent hyperbilirubinemia in breast-fed infants. In our study, the exclusively breast-fed infants were fed an average of 8–9 times/24 hr in the first day, 10–12 times/24 hr during the second to fifth days, and 12–13 times/24 hr in the sixth day of life. The product-moment correlation analyses showed that the average frequency of breast-feeding in the exclusively breast-fed neonates had no significant correlation with TSB level, BWLs, or the frequency of stool passage and urination in the first 3 days of life (data not shown). The only exception to this statement is the significant association with urination frequency in the first day of life. The association deserves further study; however, successful breast-feeding may depend more on an adequate feeding method to get enough milk amount than on feeding frequency.

Our result showed that, compared with the exclusively breast-feeding group, the incidences of BWLs greater than 7% and hyperbilirubinemia (TSB level ≥15 mg/dL) in the mixed-fed infants were significantly lower (p < 0.05, p < 0.05) (Table 2). The frequency of breast-feeding in the first 3 days after birth showed significant differences between these two groups (p values of all were less than 0.001) (Figure 2D). Further studies examining the potential advantages and disadvantages of mixed feeding are warranted.

There were several limitations of this study. First, because the discharge day from our hospital of most neonates who delivered by the method of NSD was 3 or 4 days after birth (48–72 hours or 72–96 hours after birth), the sample size (n = 72) of neonates beyond this day of life for analysis of BWLs and the frequency of stool passage and urination was relatively small for supporting a statistically valid assessment. Second, because most mother-neonate pairs in the exclusively formula feeding group were collected during the initial period of promoting breast-feeding, which was different from those in other two groups, the factors associated with a mother’s choice of feeding type (exclusively breast-feeding or exclusively formula feeding) need further study. Third, we had recorded the B-R-E-A-S-T feed observation form for every breast-fed infant, but it was not further analyzed in this study. Finally, the studied population came from one hospital, which may not be representative of the general population in Taiwan. The data should be verified in a larger study encompassing more hospitals and including more cases.

In conclusion, our study asserts that breast-feeding is associated with a significantly increased frequency and severity of jaundice and BWLs in Taiwanese healthy neonates and a lower frequency of stool passage and urination during the first 3 days of infant life. Maternal age and delivery method are associated with a mother’s choice of infant feeding type (exclusively breast-feeding or mixed feeding). Maternal breast-feeding education and careful follow-up of breast-fed infants are two crucial interventions required to help prevent inadequate breast-feeding.

References


