Impact of Maternal Nutritional Supplementation on Birth and Growth Outcomes in a Vietnamese Population

Presenter: Tran Khanh Van
In-chair organisation: National Institute of Nutrition
Financial source: Abbott Nutrition Research & Development
Clinical evaluation organisation: Quintiles Việt Nam company

Reasons to conduct the research
Factors impact on breastfeeding

Physiological factors
1. Hormone
2. Development of breast milk gland

Individual factors
1. Educational level
2. Knowledge on benefits of breastmilk
3. Improper awareness on quantity and quality of breastmilk
4. Knowledge and practice of breastfeeding

Culture, society, family factors
1. Back to work after delivery
2. Encourage to support from family
3. Knowledge and skills of health workers to promote, guide, support breastfeeding

Education, skill training and support to get improved (Renfrew & CS, 2011)

Improving sufficient nutrition during breastfeeding will effect on ingredients and volume of breastmilk (Gonzalez-Cossio & CS, 1998).

Research objectives and supposition

Objectives:
• To evaluate the efficacy of intervention of supported breastfeeding combined with nutrition supplementation for mothers from at least 8 weeks before delivery to 12 weeks after delivery on birth and growth outcomes

Hypothesis:
• Nutrition supplementation for pregnant women from at least 8 weeks before delivery to 12 weeks after delivery in combination with supportive counseling of breastfeeding before and after delivery will improve the rate of exclusive breastfeeding at 12th week
RESEARCH SITES AND TIME

1. Hà Nam
2. Ninh Bình
3. Hải Phòng
4. Thái Nguyên

Time: Jan/2013 - Jun/2015

Figure 1. Sampling diagram

Main variables
- Rate of exclusive breastfeeding
- Consumption level of breastmilk

Secondary variables
- Anthropometry indicators of children
- Nutrition consumption and anthropometry indicators of mothers

Supportive program for breastfeeding – Intervened group

Prenatal class on breastfeeding (60 min)
- Benefits of breastfeeding
- Basic knowledge on skills of breastfeeding, solutions for usual difficulties

At least 1 week before delivery

Consultants directly meet each mother
- To guide, observe and adjust the breastfeeding skills
- To answer questions on breastfeeding
- To encouraging mothers

During 48h after delivery

Consultants directly call mothers
- To ask about breastfeeding
- To answer questions on breastfeeding
- To encourage mothers

1 month after delivery

Mothers directly meet consultants at health facilities
- To ask about breastfeeding
- To receive answers about breastfeeding
- To receive encourages

1 week after delivery

Delivered

Supportive program on breastfeeding and 2 cups of milk/day

26-29th week Gestation period

228 pregnant women & delivery for the first time, 20-35 yrs, BMI before pregnant was <25

Routine care

B1. Fortified milk meets recommended nutrition allowance

<table>
<thead>
<tr>
<th>Nutrients</th>
<th>2 cups of milk</th>
<th>Meet recommended requirement for pregnant women (%)</th>
<th>Meet recommended requirement for lactating women (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy (kcal)</td>
<td>252.0</td>
<td>53 (additional energy)</td>
<td>50 (additional energy)</td>
</tr>
<tr>
<td>Protein (g)</td>
<td>16.8</td>
<td>93-143 (additional protein)</td>
<td>67-84 (additional protein)</td>
</tr>
<tr>
<td>Vitamin A (mcg)</td>
<td>244.0</td>
<td>30</td>
<td>28.7</td>
</tr>
<tr>
<td>Vitamin D3 (mcg)</td>
<td>10.0</td>
<td>50.0</td>
<td>50.0</td>
</tr>
<tr>
<td>Vitamin E (mg)</td>
<td>19.0</td>
<td>158</td>
<td>105.6</td>
</tr>
<tr>
<td>Vitamin K1 (mcg)</td>
<td>32.4</td>
<td>63.5</td>
<td>63.5</td>
</tr>
<tr>
<td>Vitamin C (mg)</td>
<td>140.0</td>
<td>175.0</td>
<td>147.4</td>
</tr>
<tr>
<td>Folic acid (mcg)</td>
<td>600.0</td>
<td>100.0</td>
<td>120.0</td>
</tr>
<tr>
<td>Vitamin B1 (mg)</td>
<td>1.5</td>
<td>107.0</td>
<td>102.7</td>
</tr>
</tbody>
</table>

ILSI SEA Region Seminar on Maternal, Infant and Young Child Nutrition, July 24, 2017, Bangkok, Thailand
**B2. Fortified milk meets recommended nutrition allowance**

<table>
<thead>
<tr>
<th>Nutrients</th>
<th>2 cups of milk</th>
<th>Meet recommended requirement for pregnant women (%)</th>
<th>Meet recommended requirement for lactating women (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitamin B2 (mg)</td>
<td>1.7</td>
<td>121.4</td>
<td>105.0</td>
</tr>
<tr>
<td>Vitamin B6 (mg)</td>
<td>2.0</td>
<td>105.3</td>
<td>100.0</td>
</tr>
<tr>
<td>Vitamin B12 (mcg)</td>
<td>4.4</td>
<td>169.2</td>
<td>157.1</td>
</tr>
<tr>
<td>Vitamin B3 (mg)</td>
<td>5.6</td>
<td>31.1</td>
<td>32.9</td>
</tr>
<tr>
<td>Vitamin B5 (mg)</td>
<td>6.0</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Choline (mg)</td>
<td>240.0</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Calcium (mg)</td>
<td>1000.0</td>
<td>83.3</td>
<td>76.9</td>
</tr>
<tr>
<td>Phosphorus (mg)</td>
<td>952.0</td>
<td>136.0</td>
<td>136.0</td>
</tr>
<tr>
<td>Magnesium (mg)</td>
<td>230.0</td>
<td>112.2</td>
<td>92.0</td>
</tr>
<tr>
<td>Iron (mg)</td>
<td>12.2</td>
<td>20.6</td>
<td>31.1</td>
</tr>
<tr>
<td>Zinc (mg)</td>
<td>20.0</td>
<td>200.0</td>
<td>210.5</td>
</tr>
</tbody>
</table>

**Research method (tt) Normal care – Control group**

- Drinking iron (60 mg elemental iron) and folic acid (400 mcg)
- Advices on breastfeeding in case of normal implementing at health facilities

**Research results**

- **Screening, randomized group (n = 228)**
  - Intervened group (n = 114)
  - Control group (n = 114)
  - 1 withdraw before receive product
  - 1 wrongly randomized group
  - Estimated data analysis (n = 113)
  - Incomplete (n = 9)
  - 5 not meet standards after delivery
  - 2 discharge due to adverse reaction

- Estimated data analysis (n = 113)
  - Incomplete (n = 13)
  - 10 not meet standards after delivery
  - 1 discharge due to severe adverse reaction

- 104 pairs of mother and child
- 100 pairs of mother and child
Table 3 Characteristics of mother at baseline

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Intervened group</th>
<th>Control group</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N=113</td>
<td>N=113</td>
<td></td>
</tr>
<tr>
<td>Age (year), mean (SD)</td>
<td>23.9 (2.7)</td>
<td>24.1 (3.0)</td>
<td>0.8142*</td>
</tr>
<tr>
<td>BMI before pregnancy (mother self-reported) (kg/m²), mean (SD)</td>
<td>19.2 (1.8)</td>
<td>19.2 (1.8)</td>
<td>0.8203***</td>
</tr>
<tr>
<td>Arm Circumference, mean (SD)</td>
<td>24.1 (1.9)</td>
<td>24.2 (2.4)</td>
<td>0.7471***</td>
</tr>
<tr>
<td>Poverty index</td>
<td>0.06 (1.59)</td>
<td>-0.04 (1.62)</td>
<td>0.6673*</td>
</tr>
<tr>
<td>Educational level, n (%)</td>
<td></td>
<td></td>
<td>0.7081**</td>
</tr>
<tr>
<td>Primary school</td>
<td>1 (0.9)</td>
<td>2 (1.8)</td>
<td></td>
</tr>
<tr>
<td>Secondary school</td>
<td>27 (23.9)</td>
<td>32 (28.3)</td>
<td></td>
</tr>
<tr>
<td>High school</td>
<td>43 (38.1)</td>
<td>36 (31.9)</td>
<td></td>
</tr>
<tr>
<td>College/University</td>
<td>42 (37.2)</td>
<td>43 (38.1)</td>
<td></td>
</tr>
<tr>
<td>Delivery method, n (%)</td>
<td></td>
<td></td>
<td>0.4872**</td>
</tr>
<tr>
<td>Normal delivery</td>
<td>76 (68.5)</td>
<td>80 (72.7)</td>
<td></td>
</tr>
<tr>
<td>Caesarean delivery</td>
<td>35 (31.5)</td>
<td>30 (27.3)</td>
<td></td>
</tr>
</tbody>
</table>

* P value was calculated by Wilcoxon, ** χ², test *** Independent T test.

Figure 3. Prevalence of exclusive breastfeeding of children in 2 research groups

**OR = 2.09 (95% CI: 1.06-4.13, p=0.0325)**

Figure 4. Comparing to intervention research on breastfeeding – Results from comprehensive analysis

Effect of breastfeeding promotion interventions on breastfeeding rates, with special focus on developing countries

Quantitative data synthesis

EBF rates at 4-6 weeks

There were thirty two randomized and quasi-randomized controlled trials that gave results of breastfeeding promotion interventions on EBF rate at 4-6 weeks postpartum [18,25,37-67], of which ten were developing country studies [18,25,37,42,64,66]. There was a statistically significant 43% increase in EBF rate at 4-6 weeks (OR = 1.43, 95% CI 1.28 - 1.60), with 89% and 20% significant increase in developing and developed countries, respectively (Additional File 2A). Sub-group analyses according to timing of intervention showed that prenatal, parental, and combined all had statistically significant.

Phân tích tổng hợp (Imdad, 2011)
During 12 weeks after delivery, children in the intervened group have a trend of eating more 30g breastmilk each day compared to the control group, $p=0.3258$.

Breastmilk consumption among children was born from mothers having arm circumference <24.1 cm.
Anthropometry indexes at birth and within 12 weeks after delivery

Table 4 Anthropometry indexes at birth

<table>
<thead>
<tr>
<th>Infant</th>
<th>Intervention group (n=111)</th>
<th>Control group (n=110)</th>
<th>95% CI</th>
<th>p* value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth weight (g), mean (SD)</td>
<td>3153 (347)</td>
<td>3044 (385)</td>
<td>92 (8,176)</td>
<td>0.0312</td>
</tr>
<tr>
<td>Birth length (cm), mean (SD)</td>
<td>49.0 (1.7)</td>
<td>48.7 (2.2)</td>
<td>0.1 (-0.3, 0.6)</td>
<td>0.5452</td>
</tr>
<tr>
<td>Head circumference (cm), mean (SD)</td>
<td>33.1 (1.3)</td>
<td>32.7 (1.6)</td>
<td>0.3 (0.0, 0.6)</td>
<td>0.0886</td>
</tr>
</tbody>
</table>

*p value was calculated from adjusted ANCOVA for fetus’s age, children’s gender

Figure 8, 9, 10. Nutrition status of children at birth

Figure 11. Anthropometry indexes of children at birth according to standard growth of WHO

*P value from GEE analysis with anthropometry data collected at the time of birth and every 4 weeks after delivery, controlling for arm circumference before intervention and/or children’s gender and/or family economy index and/or research sites and 12 weeks after delivery.
Consumption level of nutrition of mother

Figure 12, 13. Consumption level of energy and starch

Figure 14, 15. Rate of meeting recommended nutrition allowance

Figure 16, 17. Weight of mother and BMI index at T0, after delivery 48h and 4,8,12 weeks

P-value from repeated measure ANOVA using log transformed for energy and protein

P-value ANCOVA controlling for primary consumed energy before intervention and at conducting site
Conclusion

1. Increasing the prevalence of mother giving an exclusive breastfeeding to her child in 12 weeks after delivery (OR=2.09; 95% CI: 1.06, 4.13, p=0.0325)

2. Improving the prevalence of children having developmental delay in fetus (birthweight<2500g: intervention 0.9%; control 5.5%)

3. Improving anthropometry indexes of infants and 12 weeks young children after delivery: Length SS <-2SD 3.6; 10.2%; Head circumference (11.8; 24.1%) p<0.05

4. Improving the consumption capacity of energy and essential nutrients without affecting mother’s weight and BMI index within and after delivery

Recommendation

1. Need to strengthen communication activities on breastfeeding in order to improve knowledge and practices on techniques on breastfeeding and increasing the prevalence of exclusive breastfeeding during the first 6 months after delivery for mothers.

2. Need to improve nutrition status of pregnant women via increase intakes. Intakes of lactating women also need to be concerned.

3. Model of nutrition care and breastfeeding consultancy for pregnant women and lactating women can be expanded to improve the prevalence of the exclusive breast feeding and heighten nutrition status for young children in Vietnam.

THANK YOU!