The biological background for the reported beneficial effects of breastfeeding in children, including morbidity, mortality and growth

Trial lecture for the PhD defence

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Outline of the presentation

- Composition of breast milk
- Health effects and biological background of breastfeeding related to
  - Infectious diseases
  - Auto-immune diseases
  - Long-term effects
  - Other (cancer and SIDS)
  - Birth outcomes
  - Infant growth
  - Cognitive effects and gross motor skills
  - SIDS-related to breastfeeding
  - HIV transmission
  - Mortality

Medline/ Pubmed search

- PubMed search
  - 641 articles considered

In addition to the search, several cross-references from articles, reports, Cochrane reviews and related literature including
- World Health Organization (WHO):
  - Evidence on the long-term effects of breastfeeding: Systematic reviews and meta-analyses.
- Ip S et al:
  - Breastfeeding and Maternal and Infant Health Outcomes in Developed Countries. Evidence Report/Technology Assessment No. 153
    - Edited by Tufts-New England Medical Center Evidence-Based Practice Center (under Contract No. 290-02-0022). Boston, Massachusetts, Agency for Health Care Research and Quality (AHRQ) 2007.

Selection of articles

- Selection of articles depending on relevance for presentation title
- Normal circumstances around breastfeeding – Special cases and exceptions such as breastfeeding during chemotherapy not considered
- Articles in English (scientific peer-reviewed articles)
- Maternal aspects is not included in the presentation

Sources of heterogeneity across studies

- Differences in settings
- Differences in the time periods the studies were conducted
- Differences in feeding practices
- Differences in sample selection
- Publication bias
- Differences in adjusting for confounders
- Differences in:
  - Reporting information on breastfeeding
  - Selection of cases

Evidence and effect

- Week evidence, weak effect
- Week evidence, medium effect
- Week evidence, strong effect
- Medium evidence, weak effect
- Medium evidence, medium effect
- Medium evidence, strong effect
- Strong evidence, weak effect
- Strong evidence, medium effect
- Strong evidence, strong effect

Why should breastfeeding be beneficial?

- Evolution
  - Survival into reproductive age
    - Lactation developed around 200 million years ago
    - Evolution of infant and young child feeding: implications for contemporary public health
    - Cuthbertson WF: Evolution of infant nutrition
    - Annu Rev Nutr 1999
    - Sellen DW: Evolution of infant and young child feeding: implications for contemporary public health
    - Annu Rev Nutr 2007

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Biological background for cognitive effects

- Hypothesis for improved cognitive performance
  - LOE A hypothesis
  - Beneficial hippocampal-polyunsaturated fatty acids in breast milk
  - Postnatal brain development
  - Brain development
  - Systemic immune system
  - Studies of environmental contaminants (heavy metals, PCBs etc)

- Neurotrophic factors in breast milk

- Physiological interaction

Disadvantages of human breast milk

- Can transmit some viruses and bacteria (including HIV, HBV, CMV, STIs)
- For low birth weight children, additional supplementation/fortification is often necessary
- Vitamins and minerals
  - Vitamin D, vitamin E and other vitamins at lower levels or low

Breastfeeding and HIV

- Risk of HIV transmission when breastfeeding is around 2% per month, depending on maternal factors including:
  - Degree of breastfeeding involvement
  - Factors associated with decreased
  - Prevention of mother-to-child transmission
  - Study of breast milk samples shows that breastfeeding can increase HIV transmission.

2009-2010

- The guidelines from 2009 and 2010 also emphasise the importance of earlymalnourishment as an early strategy to reduce HIV transmission from mother to child.
- Differences in feeding strategies between children born to 10% positive mothers and children born to HIV-negative mothers are less pronounced in HIV-infected children.
- The current guidelines from 2010 also emphasise that HIV-positive mothers should receive the same care as HIV-negative women, particularly in low-income countries.
- The importance of nutritional and supplemental feeding during the first 6 months of life is acknowledged.

Mortality from all causes

- Estimated 10% of all child deaths could be prevented with optimal breastfeeding.

Summary

- Breastfeeding has several benefits with respect to:
  - Growth
  - Mortality
  - Health reports at school
  - Reduced risk of asthma
  - Reduced risk of childhood infections
  - Increased breastfeeding for more than one year is beneficial for five months.

For references, please see the changes in breast milk in humans, including the cognitive effects and biological background related to breastfeeding.