

One more reason for breastfeeding – prevention of diabetes!

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There is an intense interest in the effects of breastfeeding on the health of an offspring and in understanding the mechanisms behind these effects. It is widely known that breastfeeding is the most nutritious way to feed an infant, but it is less known that the benefits that a child and mother receive from breastfeeding continue throughout life, even after breastfeeding has stopped. The most important short-term immunological benefit of breastfeeding is protection against infectious diseases. There is also some evidence of lower prevalence of inflammatory bowel diseases, childhood cancers, and type-1 diabetes in breast-fed infants, suggesting that breastfeeding influences development of the own immune system of an infant¹. One of the most consistent findings of breastfeeding is also a positive effect on later intelligence tests, with a few test points advantage for breast-fed infants.

Is breastfeeding a best lifestyle approach to prevent and reduce non-communicable diseases?

In the last few years, several systematic reviews and meta-analyses have examined the effect of breastfeeding on non-communicable diseases². There seems to be a protective effect against later overweight and obesity. Blood pressure and blood cholesterol seem to be slightly lower in individuals who were breastfed as infants. Identification of lifestyle approaches, including breastfeeding practices are now considered an ideal way to decrease the dramatic increases in childhood obesity and the emergence of type-2 diabetes in youth, and to primary prevention of both conditions. Among adults, breastfeeding in infancy has been associated with reduced risk of type-2 diabetes³, but little is known regarding the potential beneficial effect of breastfeeding on the development of type-2 diabetes in adolescence. Mayer-Davis *et al.*⁴ have recently reported a protective association of breastfeeding against the development of type-2 diabetes in youth in a dose-response fashion, independent of other potentially confounding variables. Attenuation of the odds ratios when body mass index score was added to the models was con-

sistent with a causal pathway in which breastfeeding may lower the risk for childhood overweight, which may in turn reduce risk for type-2 diabetes.

What would be the biological effects of breastfeeding?

It is suggested that potential causal mechanisms for an association of breastfeeding with a reduction in childhood obesity include satiety signalling in response to nutritional composition of breast milk⁵ and overfeeding among bottle-fed infants, who exhibit significantly higher plasma insulin levels and a prolonged insulin response⁶ compared with breastfed infants. There might be many mechanisms other than weight status that could account for a protective association between breastfeeding and type-2 diabetes. Studies conducted in infants in contrast to those conducted in children and adults, showed consistent associations between breastfeeding and lower glucose and insulin concentrations. These differences could reflect lower energy intake in breastfeeding infants than in formula-fed infants⁷, differences between breast-milk composition and formulas (particularly the amino acid and protein contents), or hormonal differences that result in lower levels of fat deposition in breastfed infants^{4,8}. Another possible mechanism is that breastfeeding may improve insulin sensitivity and glucose intolerance. In a study of both breastfeeding and non-breastfeeding nondiabetic women, insulin levels and insulin/glucose ratios were lower, while carbohydrate use and total energy expenditure were higher in the breastfeeding group⁹. Various environmental toxins, particularly endocrine-disrupting chemicals, have recently been postulated as contributors to obesity and related metabolic disorders. These include bisphenol-A, which has been widely incorporated into plastic products, including infant feeding bottles¹⁰ and which has been associated with both reduced pancreatic β -cell function and insulin resistance¹¹.

Adiponectin in human milk!

High concentrations of circulating adiponectin have positive health effects through

the reduction of proinflammatory cytokines, improvement of insulin sensitivity, and increase in fatty-acid metabolism. Recently, Martin *et al.*¹² reported that adiponectin is present in human milk and is associated with maternal factors. The concentration of adiponectin in milk is much lower than in the serum, but appears to have biological significance for breastfeeding infants. Previous studies have shown that milk components are not often degraded in the stomach, in part because the composition of human milk forms a protective environment for proteins and in part because of the reduced acidity of the infant stomach and limited gastric proteolysis. Second, physiological actions of adiponectin could be important in developing infants. Because adiponectin has been shown to increase insulin sensitivity, it may also augment the action of insulin in the gut of infants. Adiponectin may also have direct effect on the gut of infants, because previous studies have documented that adiponectin receptor 1 is expressed in foetal small intestine¹³. Bronsky *et al.*¹⁴ have reported that concentrations of adiponectin, adipocyte fatty acid-binding protein, and epidermal fatty acid-binding protein in human breast milk are related to nutritional variables of mothers and newborns, and thus may play a role in the protective effects of breastfeeding. Since circulatory adiponectin levels were demonstrated to be lower in Asian Indians with metabolic syndrome¹⁵, it would be interesting to know the milk adiponectin levels and their physiological role in Indians. In this context, long-term follow-up studies are needed to assess the development of symptoms of metabolic diseases in relationship to adiponectin breast-milk concentrations.

Breastfeeding and risk reduction in type-2 diabetes

Breastfeeding may provide a degree of long-term protection against the development of type-2 diabetes, which could be of public health importance. Longer duration of breastfeeding was associated with reduced incidence of type-2 diabetes mellitus in two large US cohorts of

young and middle-aged women¹⁶, the Nurses' Health Studies I and II. In support of this, the Shanghai Women's Health Study also demonstrated that longer duration of breastfeeding was associated with a reduced risk of type-2 diabetes mellitus, independently of known risk factors for type-2 diabetes mellitus¹⁷. Previous studies have documented a lower prevalence of breastfeeding among African-American infants than among infants of other races/ethnicities¹⁸. Therefore, it is advised that targeting population subgroups at relatively high risk both for type-2 diabetes and low prevalence of breastfeeding, may offer an important opportunity for primary prevention of type-2 diabetes through promotion of breastfeeding.

In our fast-paced and pre-packaged world, it is easy to stay away from natural foods. However, when life is just starting out, nothing is better for baby than the most natural food of all – breastfeeding. Breastfeeding has been a part of our culture since ancient times. But with modernization, breastfeeding practices have gradually declined. This has resulted in activities for increasing awareness and promotion of breastfeeding. According to the Indian Academy of Pediatrics Policy on Infant Feeding, 'an ideal infant feeding comprises exclusive breastfeeding for 6 months followed by sequential addition of semi-solid and solid foods to complement (not replace) breast milk till the child is gradually able to eat normal family food (around one year)'. The latter period is also referred to as weaning. The term 'weaning' does not denote termination of breastfeeding.

Decline in breastfeeding practices – cause for concern

According to a recent (April 2008) report by UNICEF, about 160,000 infants die each year in the Asia-Pacific region due to a decline in breastfeeding. It is mentioned that just 35% of babies in the region were exclusively breastfed in the first four months of their lives. In a joint statement, WHO and UNICEF cautioned that this was 'an alarming threat to child survival', and called on countries in the region to invest more in promoting breastfeeding and to warn people of 'the

dangers of breast milk substitutes'. The effect of mass-scale commercial propaganda by baby-food companies had resulted in a disheartening and gloomy situation as far as infant health is concerned. In 1981, the World Health Assembly (WHA) took the initiative by formulating an international code regarding infant feeding by issuing regulations on the promotion, sale and marketing of teats, bottles, milk substitutes and baby foods. Based on the recommendations of WHA, the Indian Government enacted, 'The Infant Milk Substitutes, Feeding Bottles and Infant Foods (Regulation of Promotion, Supply and Distribution) Act, 1992' (IMS Act), that came into force from 1 August 1993. It has been observed that few paediatricians and obstetricians are aware of this act. This is really disheartening. The bottom-line of all these acts and activities is to emphasize that 'breastfeeding was the best, is the best and will remain the best' as far as infant feeding is concerned. Breastfeeding the baby is a women's right and not her plight. Activists of the women's liberation movement must emphasize the importance of breastfeeding. Considering the overwhelming health benefits, it is time for all of us to become activists or counsellors for breastfeeding. We should create awareness and public opinion about protection, promotion and support for breastfeeding. We need to coordinate with various voluntary organizations like the Breastfeeding Promotion Network of India, and Association for Consumer Action on Safety and Health for promotion of breastfeeding. The World Breastfeeding Week celebrated every year during 1–7 August needs to address and focus on various issues related to protection, promotion and support of breastfeeding. It is also time for the Health Ministry, Women & Child Development Department, and Human Resource Development Department, Government of India to promote and support breastfeeding through various schemes and media.

Breastfeeding is a right for every mother and child, and it is essential to fulfil every child's right to adequate food and the highest attainable standard of health and development. More research and additional evidence is needed to establish definitively whether breastfeeding protects against diabetes, the extent of pro-

tection, and the duration of breastfeeding required. In the meantime, given other well-established reasons for breastfeeding, renewed efforts to encourage this in populations at high risk for insulin resistance and type-2 diabetes, such as Asian Indians, may have tremendous health benefits.

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