

BREASTFEEDING AND CHILDHOOD ASTHMA

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This article describes some of the benefits of breastfeeding which last through childhood beyond the time when a child is actually breastfeeding.

Breastmilk, the first food

Breastmilk promotes normal infant development because it is the natural extension of life after the womb. The human baby, the slowest growing of all mammals, thought to be because of its brain, is considered by some to be born 'prematurely'.

Breastfeeding provides immediate nurturing and security beyond the womb as well as continuation of nourishment, protection from disease and maternal bonding which makes the transference to the outside world safer and less harsh.



Breastmilk reduces illness

It is thought that the protective components in human milk are directly responsible for reducing the incidence of many illnesses in infancy and childhood including acute diarrhoea, lower respiratory tract infections, and ear infections. In addition, there is evidence that breastfeeding protects against less common illnesses such as necrotising enterocolitis (NEC), bacterial meningitis, botulism, urinary tract infections and sudden infant death syndrome. In the longer term, insulin dependent diabetes mellitus, inflammatory bowel disease and childhood lymphoma are also less common in children who were breastfed.

Why is breastfeeding important?

Breastfeeding is important for the health of babies because they have immature immune systems and breastmilk provides the baby with its mother's antibodies and other defence factors. Human milk provides many protective factors that can enhance the immune system of the newborn child against infection, offering the immediate protection of antibodies and cells involved in fighting infection, as well as growth factors that continue to develop the baby's own immunity.

The antibodies in breastmilk are important in the protection against infection because they are directed against bacteria, fungi, viruses and other antigenic substances to which the mother has been recently exposed. In addition, mother's milk contains

lactoferrin that has an anti-inflammatory action; lysozyme that attacks the walls of certain bacteria; oligosaccharides (complex sugars) that prevent binding of toxic substances to the cells lining the airway and fats that have an antibacterial action. As well, breastmilk contains a number of specific factors that promote growth and maturation of the baby's immune system. Thus breastfeeding provides health benefits for all infants in ways that infant formula cannot.

What is the risk of asthma?

Asthma is the leading cause of hospitalisation in Australian children and its prevalence is increasing. Susceptibility to asthma is influenced by events occurring early in life and reported risk factors include being male, being born with a low birthweight or preterm, young maternal age, maternal smoking and exposure to house dust mite or pollen. Breastfeeding as a protective factor for asthma has been the subject of controversy for many years, with recent publications reporting either protection or no effect of breastfeeding.

Furthermore, early exposure to respiratory infections may protect against asthma whereas some infections may be a definite risk. Breastfeeding protects against infection in infants, but this protection has not been consistently demonstrated. Differences in research design and analytic methods have complicated the interpretation of many studies. Also researchers need to take into account other factors in the lives of their subjects that might affect their results, for example, women in Australia who breastfeed tend to be better educated and have higher incomes.

The Western Australian Pregnancy Cohort Study

Because of the controversy in the literature an epidemiological prospective cohort study was necessary. This is a type of study that looks at the determinants of disease in defined populations and collects information as it happens in a group of babies and children, rather than looking back at what has happened in the past. This way the researchers could follow children from birth throughout the first years of life and collect accurate information on early infant feeding, respiratory tract illness and asthma later in childhood. Just such a study existed at the TVW Telethon Institute for Child Health Research and was known as the Western Australian Pregnancy Cohort Study. A total of 2,979 children were enrolled by 18 weeks of pregnancy (ie before birth) and 2,602 children remained in the study at six years of age.

Because asthma in children is complex it must be defined carefully. Our definitions of asthma at six years of age included current asthma diagnosed by a doctor, wheeze and sleep disturbance due to wheeze. A child was considered to be atopic (allergic) if

the result of a skin prick test to common environmental allergens was positive. Asthma was diagnosed in 31% of the children, 12% had wheezing severe enough to disturb sleep and 41% had a positive skin prick test.

Exposure to breastfeeding was measured in two ways - firstly, as the duration of any breastfeeding and secondly as the duration of exclusive breastfeeding. Exclusive breastfeeding was defined by the age that any non-human milk was introduced. Statistical analysis consistently indicated that the age other milk was introduced (duration of exclusive breastfeeding) was the more important factor, when both breastfeeding exposures were measured.

Breastfeeding protects against respiratory illness and asthma

The results of the Western Australian Pregnancy Cohort Study indicated that the introduction of infant formula before four months of age was significantly associated with an increased risk of lower respiratory tract illness and infections, ear infections, asthma and allergy. In addition, being male, being born at less than 37 weeks gestational age and any parental smoking were associated with an increased risk of asthma in children.

It appears that breastfeeding protects against asthma by protecting against respiratory tract illness and infection. An interesting yet disturbing finding of our research is that a child is more likely to be hospitalised in the first five years of life if infant formula is introduced before four months of age. This was true for any respiratory tract illness or infection including bronchiolitis, the need for grommets for recurrent ear infections and asthma.

An infant's first food is likely to be the most significant environmental exposure in the first few months of life. Other studies have shown protection by breastfeeding against gastrointestinal illness and many other diseases. As demonstrated in our studies, mother's milk in the newborn period provides significant protection against respiratory tract disease in infancy and childhood. Breastfeeding provides subtle and not-so-subtle protection against infections which may ultimately affect the child's asthma risk.

How does breastfeeding protect against respiratory illness and subsequent asthma?

The question of how breastfeeding protects is complex, due to the immunologic and other nutritional benefits in the milk. The lungs may be protected in a number of ways. Because small droplets of milk naturally enter the baby's airways and lungs during feeding, antibodies and other protective factors in the milk are delivered to the

respiratory tract and protect against respiratory infection. Indeed, stomach contents of breastfed infants have antibacterial and antiviral activity, possibly as a result of breakdown of the milk fat in the infant's stomach, which produces free fatty acids. These fatty acids in breastmilk have a protective effect that reduces the risk of infection in the lungs.

Specific components in human milk may promote maturation of the immune system. There are large numbers of active white cells (the cells that fight infection) and these release biologically active chemicals into the digestive system and surrounding tissues, which influence the developing immune system. Of note is that exclusively breastfed babies have significantly larger thymus glands during infancy than babies fed infant formula. The thymus gland sits above the heart and is the primary central gland of the immune system in a baby, so the difference in size of this gland is likely to have significant effects upon the development of an optimal immune system.

Furthermore, lung development is aided by growth factors in human milk. The specific biologically active factors in mother's milk promote airway and lung growth in the infant and hence indirectly protect against wheeze, the major symptom of asthma.

Diet and asthma

With respect to the functioning of the immune system, there is growing interest in the role of certain dietary fat components. These are more commonly known as the omega-3 fatty acids. The fact that human milk is rich in omega-3 fatty acids and infant formula is not, is cause for concern. The omega-3 fatty acids are also found in fish oils and these are required in important metabolic pathways in the body when it mounts an inflammatory response.

It is interesting that children who eat fresh fish at least once a week are less likely to experience asthma. Furthermore, a lactating mother can transfer additional nutrients to her baby through her milk if she eats plenty of fresh fish (preferably oily fish such as mullet, salmon and tuna) or other foods high in the omega-3 fatty acids, such as linseed, sunflower and almonds. Also very valuable in this context are foods with antioxidant nutrients (vitamins C and E, zinc, selenium) such as fresh fruit, vegetables, whole grains and legumes. A mother's diet should be varied and the balance should not be compromised in favour of any one food group.

Rates of breastfeeding

In Australia, rates of breastfeeding are better than some other developed countries with 58% of babies breastfed at four months. In the United States, rates are 60% at

three months and 20% at six months, and in the UK just 25% of babies are breastfed at four months. Although Australian rates are better than others they are far from ideal. In Scandinavian countries up to 80% of babies are breastfed at three months of age, suggesting that if sufficient resources are invested in breastfeeding public health promotion programs, rates can increase.

A number of complex factors are involved in the low rates of breastfeeding, including a consistent association between maternal smoking and shorter duration of breastfeeding, hospital practices of separation of mother and baby and early introduction of complementary feeding with infant formula. There is evidence too, to suggest that fathers play an important role in the breastfeeding decision and that intended duration of breastfeeding is a strong predictor of actual duration. It is of major concern that downward trends in breastfeeding have occurred in developing countries, especially in urban regions, where infant formula feeding in early life is particularly risky healthwise.

A public health perspective

Breastmilk is specifically suited to the needs of human babies and it is known that breastmilk substitutes increase the risk of illness in children. From a public health perspective, it is important for mothers to know about the long-term health effects of breastfeeding and that the benefits for the child last well beyond the breastfeeding period. In the year 2000, Australia's goals in this area are to achieve 90% breastfeeding on discharge from hospital, 60% fully breastfed at three months of age and 50% fully breastfed at six months of age.

Achieving these goals will require the continuing wide promotion of breastfeeding and the further implementation of strategies to support all women. Strategies should include the provision of facilities for breastfeeding mothers in the workplace, flexible work options and a breastfeeding policy in the workplace. Public health strategies which actively involve local health care agencies in the further promotion of breastfeeding could help protect the majority of babies from early exposure to infant formula feeds, and provide support for all mothers who choose to breastfeed.

There is increasing evidence of the role of early infant diet in the prevention of systemic and allergic illnesses, such as asthma, throughout childhood. Reaching the Australian goals for breastfeeding rates will bring improvements in infant and child health, benefits for the environment and economical benefits for families and within the community.

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