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The Effect of Breastfeeding on the Development of Atopic Diseases

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Abstract

Atopic diseases are common worldwide health problems and because of their genetic nature, a lot of studies investigate how to prevent the development of such diseases by adjusting the environmental factors that might provoke the expression of these genes. Most of these studies were related to the role of breastfeeding and its components as it is an important environmental factor and has an important role in the development and modulation of the immune system. The study was done in helsinki university central hospital and involved 235 healthy, newborn babies born at term during the first 3 months of 1975. The newborns were grouped according to their breastfeeding duration into prolonged (6 months or more), intermediate (6 months or less) and short or no breastfeeding (1 month or less) and followed up for 17 years. The investigations were about the development of eczema, food and respiratory allergies. Then the results revealed that the risk of development of eczema and respiratory allergies was reduced in prolonged breastfeeding group, while the risk of food allergy development was most reduced in short or no breastfeeding group. The study concluded that breastfeeding has beneficial effect on reducing the development of some atopic diseases by various levels.

Introduction

Atopy is a genetic predisposition to produce an immune response against diverse antigens or allergens that induce T helper 2 cell differentiation and associated with elevated IgE levels. Atopic diseases that share this mechanism include eczema, food and respiratory allergies. Eczema is a condition in which the skin become irritant and inflamed due to exposure to allergic substances. Food allergy is another atopic disease caused by the ingestion of allergic food such as milk, egg and peanuts and irritate the gut mucosal surface resulting in diarrhea and other symptoms. Asthma is an example of respiratory allergies, which is a condition of inflamed, narrowed airways leading to difficulties in breathing. Environmental factors also have a role in the sensitization and later development of atopic disorders in infancy because their immune system is still immature[1]. Therefore the protection against atopic diseases could be by the improvement of the immune system. Several studies suggested that breastfeeding is used as a prophylaxis against atopy development[1]. However the protective mechanism of breast milk is not well known. This is expected to be through the help of the immunomodulatory components of human milk, shaping the gut microbiota by direct neonatal exposure to the milk microbiota or indirectly, via maternal milk factors that affect bacterial growth and metabolism such as human milk oligosaccharides in which they are considered to have a protective role by serving as pre-biotics which aid in the growth and activity of Beneficial bacteria, such as bifidobacterium and lactobacillus species by acting as substrates for the fermentation processes of the gut microbes, secretory IgA, and anti-microbial factors[2]. Therefore all of these are expected to be included in the development of immune system thus they could represent a route for reducing the risk of atopic diseases. The aim of this study is to investigate whether breastfeeding has a role in preventing atopy development and reducing its risk or not.

Materials and Methods

The study involved 235 infants were born in Helsinki University Central Hospital at 1975, their mothers were advised to breastfeed them for at least for 6 months where then they were divided by one of the authors Dr. Ulla M Saarinen into three groups according to the duration of

breastfeeding into: 1) prolonged breastfeeding (6 months or more), 2) intermediate breastfeeding (less than 6 months), and 3) short or no breastfeeding (less than 1 month), with monitored feeding regimens and the avoidance of fish and citrus fruits during the first year. they were followed up for 17 years and in each follow up visit, a medical history was taken, physical examination and laboratory tests were made, including skin-prick test with standard allergens. Total IgE concentration was also measured at several years, in addition to Radioallergosorbent test (RAST) at the ages of 5 and 10 years for the detection of atopy, phadiatop screening test was used to detect the IgE-mediated allergy at the age of 17 and nasal eosinophil counts were also studied from 3 to 17 years of age.[1]

Results

The prevalence of atopy in the whole study was 20% at 1 year of age, and reached 47% at 17 years, while 29% of them developed substantial atopy. 70 of 150 individuals were atopic at 17 years of age, 68 of them were skin prick positive, only 2 were skin prick negative with family history. The cumulative incidence of atopy in individuals with either manifest or latent atopy increased from 1 to 17 years in a range of 20% - 67%. Of the whole subjects 49% were atopic with family history at the age of 1 year, and 54% at 17 years. The prevalence of atopy in short or no breastfeeding was the highest ($p<0.05$). The development of atopy observed in 42%, 36%, and 65% of the prolonged, intermediate- and short or no- breastfed individuals respectively, while substantial atopy were in 8%, 23%, and 24% at 17 years old ($p<0.0001$). The prevalence of development of atopic disease of each breastfeeding (BF) duration group at different ages are listed in table (1). Concerning eczema it was the lowest at 1 – 3 years of age in prolonged breastfeeding group ($p=0,03$), Food allergy reached a prevalence peak of 36% at 3 years of age in short or no breastfeeding group ($p=0.02$), while respiratory allergy was the most prevalent atopy in short or no breastfeeding group at 5, 10, and 17 years ($p=0.01$).[1]

groups / Years	eczema		Food allergy		Respiratory allergy		Total
	Prolonged BF	Short/no BF	intermediate BF	Short/no BF	intermediate BF	Short/no BF	
1		17%					235
3				36%	<5%		177
5							153
10			7%				135
17	3%					64%	150

Table (1): the prevalence of development of atopic disease of each breastfeeding (BF) duration group at different ages.

Discussion

The long term follow up study indicated that breastfeeding is associated with the protection against the development of atopic diseases. The study revealed that the highest prevalence of atopy were in short or no breastfeeding group, and by comparing atopy development in prolonged- to short- or no breastfeeding, they found that the tendency to develop atopy in short breastfeeding group was approximately 1.5 times higher. The differences between the groups and the ages is not constant. The eczema was least prevalent at 1 to 3 years of age in prolonged breastfeeding group, thus prolonged breastfeeding seems to be beneficial in preventing atopic eczema through that age.[1] Another study done in 1979 and 1980 suggested that the prevalence of eczema was related to the early introduction of cow milk at 3 months and breastfeeding could reduce the risk. When they compared cow milk fed infants to breastfed infants only during the first 4 weeks of life they found that the prevalence of eczema were 24% and 13% respectively.[3]

For food allergy the prevalence reached its peak at 3 years and then greatly decreased in the group of short or no breastfeeding during adolescence, subsequently, short duration of breastfeeding (less than one month) could prevent food allergy development more than prolonged breastfeeding group.[1] In case of peanut allergy, a study done in Canada found that

eating peanut products during pregnancy and breastfeeding was associated with peanut allergy development in offsprings as they are transmitted through human milk, but breastfeeding itself did not appear to have a role in peanut allergy development.[4] This may indicate that food allergy development could be related to the allergic food ingested by the mother and transmitted through breast milk not with the duration of breastfeeding.

The prevalence of respiratory allergy, including asthma, was highly increased at the age of 17 years, reaching about 64% in short or no breastfeeding, therefore the high prevalence of respiratory allergies are highly related to short or no breastfeeding.[1] Another study done on Dutch children also proposed that breastfeeding for more than 4 months reduces the risk of asthma and lowers the sensitization to airborne allergens in children with allergic and non-allergic mothers at 8 years of age when compared to non-breastfed children.[5] Therefore this suggests that breastfeeding could significantly reduce the risk of respiratory allergy development.

Conclusion

Breastfeeding is well known for its benefits for the general health of infants especially regarding their immune system development, however, its role in preventing atopic diseases is still under investigation where various studies have shown that it has reduced the incidence of some atopic diseases such as eczema, food and respiratory allergies in different durations of breastfeeding and the best recommended duration is 6 months or more.

Future work

The future studies must be on the effect of the mother lifestyle, from the first day of pregnancy until the end of lactation period, by monitoring their food habits, investigating suspected allergic factors and comparing the babies of mothers on controlled diet, avoiding allergic food, with the babies of mothers on uncontrolled diet.

References

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