

ATOPY AND NEWBORN

NOU-NĂSCUTUL ȘI BOALA ATOPICĂ

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Abstract

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Over the past several decades, the prevalence of atopic disease, such as atopic dermatitis (AD), asthma and food allergies, continued to rise, reaching 20% in some parts of the world. The incidence of AD has increased twofold to threefold among children up to 4 years old; almost half of all children experience eczema within the first 2 years of life. The disease reduces patient's quality of life, by disturbing sleep, and should be considered a significant global burden. AD is a complex disorder and the subject of genetic, immunological and environmental influences. This report reviews the nutritional options during the first year of life that may have an important influence on infant development and presents some methods to prevent or delay the onset of the atopic disease. Also, we took in consideration some immunological changes related to AD and the role of emollient therapy to prevent eczema.

Rezumat

Cuvinte-cheie:

atopie, dermatită atopică, alăptare, formula hidrolizată, screening IgE la nou-născuți

De-a lungul ultimelor decenii, prevalența bolilor atopice, cum este dermatita atopică (DA), astmul și alergiile alimentare, a continuat să crească, ajungând la un procent de 20% în unele părți ale lumii. Incidența DA a crescut de două până la de trei ori în rândul copiilor de până la 4 ani; aproape jumătate dintre copii au eczeme în primii doi ani de viață. Boala afectează calitatea vieții, apar tulburări de somn și devine o problemă majoră la nivel mondial. Alergiile nu sunt unicele responsabile pentru declanșarea DA, boala are cauze multiple cu influențe genetice, imunologice și de mediu. Acest review analizează opțiunile nutriționale din primul an de viață care pot avea o influență importantă asupra dezvoltării copilului și prezintă câteva modalități de prevenire sau întâziere a instalării bolii atopice. De asemenea, am luat în considerare unele modificări imunologice întâlnite în DA și rolul terapiei emoliente în prevenirea eczemelor.

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INTRODUCTION

In 1925, Arthur F. Coca, in his studies Hyper-sensitiveness, introduced the term "ATOPY" signifying the tendency to develop allergies to food and inhalant substances manifested by skin reaction, asthma and hay fever on a hereditary bases.

ATOPY is a genetic predisposition to form excessive Ig E antibodies. The reaction may manifest with one or more of immunologic reactions such as eczema, asthma, hay fever and conjunctivitis.

Eczema, a common, chronic, relapsing inflammation of the skin is often seen in young children ⁽¹³⁾.

Over the past 3 decades, the rate of eczema among children has increased, including the rate of atopic dermatitis (AD), a type of eczema ⁽¹⁾. Some 20% of school-aged children in North America and 10% of children in Western Europe suffer from eczema ^(1, 13).

Similarly, incidence in other industrialized nations is about 20% ⁽¹³⁾.

AD is a complex disorder with genetic, immunological and environmental influences who should be considered a significant global concern ⁽²⁻⁶⁾.

AD is a characteristic chronically recurrent form of dermatitis with a hereditary predisposition affecting infants before the age of six months or can appear later in childhood or in adult age.

Skin manifestations appear after birth from two months to two years old.

Dermatitis can affect any part of the body especially cheeks, neck, flexural, popliteal areas and antecubital areas.

The skin is itchy, red and irritated. Newborns can have patches of skin lesions like bumps, red, rough spots or dry, scaly patches. The affected skin may have a darker colour.

As atopic eczema can cause your skin to become dry and cracked, there is an increased risk of skin infection. Secondary infection, characterised by pustules and crusts, is very common, predisposed by the abraded skin surface and severe itching.

Erithroderma and constitutional symptoms such as fever, vomiting, abdominal colic and diarrhoea are common in severe causes or infantile eczema.

ETIOLOGY

Different factors play a role in the etiology of AD:

- genetic predisposition and hereditary factors are the most important in the etiology of infantile eczema. There is mounting evidence that genetic linkage and family history are risk factors for developing eczema ⁽¹⁴⁾. Screening of family history and high serum cord IgE recommend the introduction of dietary and environmental measures to prevent atopy;

- environmental prenatal and perinatal factors, exposure to household allergens, infections, cigarette smoking, dietary factors, including those during pregnancy, duration of breastfeeding, dietary measures during lactation, all have effects in modifying the atopic response ⁽¹⁵⁾.

HUMAN MILK, FORMULA, SOLID FOOD AND ATOPIC DERMATITIS

For many years, food has been considered a trigger for eczema ⁽¹³⁾.

According to the American Academy of Paediatrics, the moment of introducing solid food can also affect the development of AD ⁽⁷⁾. It is recommended that initiating solid food to delay the introduction of solid food until 4 to 6 months of age, and whole cow's milk be delayed until 12 months of age ⁽⁷⁾.

Since the 1930s, many studies have examined the benefits of breastfeeding on the development of atopic disease.

Breast milk contains α , β tocopherol and prolactin compounds with a role in increasing immune function and decreasing sensitivity of infants ⁽¹⁶⁾.

A 2001 meta-analysis of 18 prospective studies compared the incidence of AD in infants who were breastfed versus infants who were fed with cow milk formula ⁽¹⁷⁾. There was evidence of a protective effect of exclusive breastfeeding for 3 months, the stronger effect having been shown for infants with a family history of allergy. No protective effect of breastfeeding was seen in children who were not at risk of developing allergy.

In Sweden, according with two studies results published in 2005, we found that, with or without a family history of allergy, exclusive breastfeeding for <4 months has no effects on the incidence of AD in the first year of life, but exclusive breastfeeding for more than 4 months reduced the risk of AD at 4 years of age ^(18,19).

Other authors, in their reviews, also found no benefit of exclusive breastfeeding beyond 3 months of age on the incidence of AD in studies in which parents were not selected for risk of allergy ⁽²⁰⁾.

A recent report from the German Infant Nutritional Intervention Program showed a positive effect of exclusive breastfeeding for 4 months compared with breastfeeding with supplemental cow milk formula in these infants at high risk of developing allergy ⁽⁷⁾.

Several studies have evaluated the potential to reduce the risk of allergies for hydrolyzed formula compared with cow's milk.

Breastfeeding with hydrolyzed formula (partially and extensively hydrolyzed) also showed a positive effect compared with breastfeeding supplemental cow milk formula; however, breastfeeding with supplements of hydrolyzed formulas showed no advantage compared with exclusive breastfeeding ⁽²¹⁾.

Osborn and Sinn in a Cochrane Database comparing soy formula with human milk, cow's milk formula and hydrolyzed protein formula on the development of atopy, no significant benefit in preventing infants eczema offered by soy formula ⁽²²⁾. In summary, for infants at high risk of developing atopy, there is evidence that exclusive breastfeeding for at least 4

months or breastfeeding with supplement of hydrolyzed infant formulas decreases the risk of AD compared with breastfeeding with supplements of standard cow milk-based formulas. This is less likely to apply to infants who are not at risk of developing atopy, and exclusive breastfeeding beyond 3 to 4 months does not seem to offer any benefit in the incidence of atopic eczema ⁽²⁰⁾.

IMMUNOLOGIC ABNORMALITIES IN AD

Since the detection of IgE in the mid-1960s, overwhelming evidence has been presented concerning the correlation between atopic disease and raised IgE levels.

In many studies, cord serum IgE levels are examined in newborns of atopic parents to determine any relation with signs and symptoms of allergic rhinitis, bronchial asthma, AD, urticaria and food allergy.

High IgE levels were present before the manifestation of atopic symptoms in studies on selected groups of children, including newborn infants ⁽⁸⁻¹¹⁾. Atopic disease developed in 75% of infants with a high IgE concentration in cord blood and a family history, but in only 3% of infants with a low IgE and no family history ^(12,23).

The fetal synthesis of IgE may be stimulated by components in the mother's diet, which possibly cause the "allergic break-through" suggested by Katz ⁽²⁴⁾. A hypoallergenic maternal diet during pregnancy, when both parents suffer from atopic disease, might therefore be of prophylactic value for the child ⁽¹²⁾.

Recent studies have suggested that epidermal barrier dysfunction contributes to the development of AD and other allergic diseases.

Japanese Institute performed a prospective controlled trial to investigate if protecting the skin barrier with a moisturizer during the neonatal period prevents the development of AD and allergic sensitization.

Researchers of the National Centre for Child Health and Development in Tokyo found that regular use of emollients during the first 32 weeks of life can help the immune system to function properly ⁽²⁵⁾.

Application of moisturizer prevents the skin from drying and cracking. Dry cracked skin allows irritants to enter the body, exposing immune cells to those irritants. In order to combat those irritants, the immune system produces antibodies; this over-production of antibodies causes the symptoms of allergy such as AD and allergies and food allergies ⁽²⁵⁾.

CONCLUSIONS

Eczema, formally known as AD, is a common disorder in infants and is associated with dry, red and itchy patches of skin.

Genetic predisposition is the most important factor in the etiology of AD, but food, especially human milk and formulas have also an important effect.

The World Health Organization recommends exclusive breastfeeding for the first 6 months and continuing to breastfeed as well as introducing other foods, until 2 years of age ⁽²⁶⁾.

Exclusive breastfeeding for at least 4 months compared with cow's milk formula decreases the incidence of AD in the first 2 years of life for infants at high risk of developing atopic disease.

AD may be delayed or prevented by the use of hydrolyzed formulas, compared with cow milk, in early childhood for infants at high risk of developing atopic disease.

While some reports suggest positive effects in preventing AD by breastfeeding or changing the maternal diet, other studies show insignificant or reverse effects ⁽²⁷⁾.

Thus, exclusive breastfeeding or breastfeeding with hydrolyzed formula is not enough to prevent the majority of cases of AD and, for infants without family history of atopic disease, the advantages of breastfeeding are less clear.

There is no evidence on the use of soy-based infant formula for the allergy prevention.

There is also little evidence that delaying the timing of the introduction of solid foods beyond 4 to 6 months of age prevents the occurrence of atopic disease ⁽⁷⁾.

Emollient therapy in newborn babies is an inexpensive and easy way to prevent and treat eczema and food allergies ⁽²⁵⁾. Daily application of moisturizer during the first 32 weeks of life reduces the risk of AD in infants ⁽²⁵⁾.

IgE screening in cord blood is recommended if there is obvious atopy in both parents or if severe atopy disease is present in a sibling or in one parent ⁽¹²⁾.

We conclude that, even if the role of human body in allergic disease remains controversial, breastfeeding during the first 4 months of life is prophylactic against atopic disease throughout childhood and adolescence, especially in cases when the mother herself is allergic ^(28,29).

Breast-feeding should be strongly recommended to mothers of infants with a family history of atopy, as a possible method of preventing atopic eczema.

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References

- Eichenfield LF, Hanifin JM, Beck LA, et al. Atopic dermatitis and asthma: parallels in the evolution of treatment. *Pediatrics*.2003;111 :608- 616
- Deckers IA, McLean S, Linssen S, Mommers M, van Schayck CP, Sheikh A. Investigating international time trends in the incidence and prevalence of atopic eczema 1990-2010: a systematic review of epidemiological studies. *PLoS One* 2012;7:e39803.
- Flohr C, Mann J. New insights into the epidemiology of childhood atopic dermatitis. *Allergy* 2014;69:3-16.
- Lowe AJ, Carlin JB, Bennett CM, Hosking CS, Abramson MJ, Hill DJ, et al. Do boys do the atopic march while girls dawdle? *J Allergy Clin Immunol* 2008; 121:1190-5.
- Lio PA, Lee M, LeBovidge J, Timmons KG, Schneider L. Clinical management of atopic dermatitis: practical highlights and updates from the atopic dermatitis practice parameter 2012. *J Allergy Clin Immunol Pract* 2014;2:361-9.
- Leung DY, Jain N, Leo HL. New concepts in the pathogenesis of atopic dermatitis. *Curr. Opin. Immunol.*2003; 15: 634-638.
- Frank Greer, Scott Sicherer, A Wesley Burks and the Committee on Nutrition and Section on Allergy and Immunology. Effects of Early Nutritional Interventions on the Development of Atopic Disease in Infants and Children: The Role of Maternal Dietary Restriction, Breastfeeding, Timing of Introduction of Complementary Foods, and Hydrolyzed Formulas 2008. *Pediatrics. Jan*; 121(1), 183-91.
- Foucard T. A follow-up study of children with asthmatoïd bronchitis. II. Serum IgE and eosinophil counts in relation to clinical course. *Acta Paediatr Scand.*1974 Jan;63(1):129-139.
- Orgel HA, Hamburger RN, Bazaral M, Gorriñ H, Groshong T, Lenoir M, Miller JR, Wallace W. Development of IgE and allergy in infancy. *J Allergy Clin Immunol.* 1975 Oct;56(4):296-307.
- Kjellman NI. Predictive value of high IgE levels in children. *Acta Paediatr Scand.* 1976 Jul;65(4):465-471.
- Dannaeus A, Johansson SG, Foucard T. Clinical and immunological aspects of food allergy in childhood. II. Development of allergic symptoms and humoral immune response to foods in infants of atopic mothers during the first 24 months of life. *Acta Paediatr Scand.* 1978 Jul;67(4):497-504.
- S Croner, N I Kjellman, B Eriksson, and A Roth. IgE screening in 1701 newborn infants and the development of atopic disease during infancy. *Arch Dis Child.* May 1982; 57(5): 364-368.
- Finch J, Munhutu MN, Whitaker-Worth DL. Atopic dermatitis and nutrition. *Clin Dermatol* 2010;28(6):605-14.
- Snijders BEP, Stelma FF, Reijmerink NE, Thijs C, van der Steege G, Damoiseaux JGMC, et al. CD14 polymorphisms in mother and infant, soluble CD14 in breast milk and atopy development in the infant (KOALA study). *Pediatr Allergy Immunol* 2010;21(3):541-9. Epub 2009 Sep 15.
- Cantani A, Businco L. Prevention of atopic diseases in at risk newborns. Department of Pediatrics , University of Roma La Sapienza Medical School Italy. *Allergy and Immunology* 1991, 387-390.
- Oddy WH. The long-term effects of breast-feeding on asthma and atopic disease. *Adv Exp Med Biol* 2009;639:237-51.
- Gdalevich M, Mimouoni D, David M, Mimouni M. Breast-feeding and the onset of atopic dermatitis in childhood: a systematic review and meta-analysis of prospective studies. *J Am Acad Dermatol.*2001;45 :520- 527.
- Ludvigsson JF, Mostrom M, Ludvigsson J, Duchon K. Exclusive breastfeeding and risk of atopic dermatitis in some 8300 infants. *Pediatr Allergy Immunol.*2005;16 :201- 208.
- Kull I, Bohme M, Wahlgren CF, Nordvall L, Pershagen G, Wickman M. Breast-feeding reduces the risk for childhood eczema. *J Allergy Clin Immunol.*2005;116 :657- 661.
- Kramer MS, Kakuma R. Optimal duration of exclusive breastfeeding. *Cochrane Database Syst Rev.*2002;(1) :CD003517.
- Von Berg A, Koletzko S, Grübl A, Filipiak-Pittroff B, Wichmann HE, Bauer CP, et al. The effect of hydrolyzed cow's milk formula for allergy prevention in the first year of life: the German Infant Nutritional Intervention study, a randomized double-blind trial. *J Allergy Clin Immunol* 2003;111(3):533-40.
- Osborn DA, Sinn J. Soy formula for prevention of allergy and food intolerance in infants. *Cochrane Database Syst Rev* 2004;(3):CD003741.
- Businco L, Marchetti F, Pellegrini G, Perlini R. IgE levels in "at-risk" newborn babies and influence of type of feeding. *Clinical& Experimental Allergy* November 1983; vol.13, issue 6: 503-508.
- Katz DH. New concepts concerning the clinical control of IgE synthesis. *Clin Allergy.* 1979 Nov;9(6):609-624.
- Kenta Horimukai, MD et al. Application of moisturizer to neonates prevents development of atopic dermatitis. Tokyo, Tokushima, Hiroshima, and Osaka, Japan; *J Allergy Clin Immunol*, October 2014, Volume 134, Number 4, 824-830.
- World Health Organization [website]. Exclusive breastfeeding. Geneva, Switz: World Health Organization; 2011. Available from: www.who.int/nutrition/topics/exclusive_breastfeeding/en/. Accessed 2011 Jul 30.
- Tina Y. Lien Ran D. Goldman MD. Breastfeeding and maternal diet in atopic dermatitis Vol 57: december • décembre 2011 | Canadian Family Physician • Le Médecin de famille canadien; 1403-1405.
- U.M.Saarinen, MD, M.Kajosaari, MD. Breastfeeding as prophylaxis against atopic disease: prospective follow- up study until 17 years old; *The Lancet*, 21 oct 1995, volume 346, 1065-1069.
- Alan M. Dattner, MD. Breastfeeding and atopic dermatitis: protective or harmful? Facts and controversies. *Clinics in Dermatology*, January- February, 2010, vol 28, issue 1, pages 34-37.